THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY

Publishing Office, No. 42 Pine Street.

Devoted to the Interests of Illumination, Heating, Ventilation and Sanitary Improvement, Domestic Economy, and General Science. Including Water Supply and Distribution.

VOLUME XXIII.—No. 11. Whole No. 395. | NEW YORK. THURSDAY DECEMBER 2, 1875. | $3 PER ANNUM IN ADVANCE.

Third Annual Meeting of the American Gas-Light Association.

HELD AT MASONIC TEMPLE, NEW YORK, OCTOBER 20TH, 1875

[Continued from page 205.]

Mr. Edgerton—In reference to the dilution of oil gas, the question in my mind is—whether it be either necessary or desirable to dilute it with coal or other gas. In Scotland, where 30 to 22 candle gas is made, they might just as well consider the propriety of using Newcastle coal, and bring the standard down to 15 to 16 candles, as for us to consider the propriety of using petroleum gas only as an enricher of coal gas, instead of adopting the standard the material naturally yields. Now, the results obtained from practical operations, and experience, show conclusively that, the proper method to use petroleum is to make the gas pure, or exclusively of oil, and sell it at a price proportioned to its illuminating power. The great economical value of oil gas turns on this point. Prices are actually obtained all over the country, ranging from ten to thirty-five dollars per thousand cubic feet, that is, 60 to 80 candle gas. Consequently, you can manufacture gas of high illuminating power, and by getting pay in proportion to its illuminating value, secure a far greater net revenue to your companies than by any other method.

Taking the figures given by Mr. Patton, you must arrive at the same conclusion.

Now, in regard to the dilution of rich gases in the old country; at one time it was proposed to use "water gas" (hydrogen, carbonic oxide, and carbonic acid) and the question was very thoroughly discussed pro and con by Prof. Frankland and Dr. Fyfe, and here I read you an extract showing on what grounds water gas received a quietus.

"To determine in what ratio the illuminating power of the gases obtained from both oil and coal, was reduced by diluting them in various proportions with hydrogen, we instituted a series of experiments the results of which are of importance, inasmuch as they indicate not only that the mixture is deteriorated but that the same quantity of carbonaceous matter yields less light the more largely it is diluted with hydrogen."

In the first experiment we took a portion of coal gas of the specific gravity ·67, which we found to consume at the rate of 4,400 cubic inches per hour, and yielded the light of eleven candles, being 400 cubic inches per hour for the light of one candle. This gas being diluted "with a-fourth part of its bulk of pure hydrogen, acquired specific gravity ·55, and wasted away at the rate of 6545 cubic inches per hour, yielding the light of ten candles. As a-fifth part of the compound was hydrogen, the remaining four-fifths, amounting to 5236 cubic inches, was the quantity of coal gas which in its diluted state, gave the light of ten candles for one hour; so that 524 cubic inches of coal gas were requisite to give the light of one candle for the same time. But in its unmixed state, 400 cubic inches were sufficient to give the light of one candle for an hour, and, consequently, the deterioration occasioned by the dilution was in the ratio of 524 to 400, being 24 per cent."

Further results showed—"for one-third hydrogen, a deterioration of 27 per cent.; for one-half hydrogen, 31 per cent."

The whole question then, of the propriety of diluting rich gases, depends upon the fact—whether after dilution the total illuminating effect is as great as before. Using diluents will necessarily increase the size of holder, mains, and all the apparatus; and will consequently increase cost of manufacture in every particular. Therefore, if it can be proved to your satisfaction, that a rich gas can be sold for a sum proportional to its illuminating power, the whole question is more favorably solved than by resorting to diluents to maintain the ordinary 15 to 16 candle standard.

Finally, then, as between coal gas and oil gas, taking the same illuminating quality as a basis, what are the comparative merits? I give you the results, extending over a period of three years in a large works,* which show, on a manufacture of 400,000 to 600,000 daily of the oil gas, that diluted with air to the extent of 19 to 20 per cent., 42 candle gas is obtained—petroleum-naphtha used, averaging somewhat less than ten gallons per thousand cubic feet, and seventy thousand cubic feet per day per stoker, is the labor average. Benches in use 3 years, without renewals, yield 120,000 per day, per bench of 12″ × 20″, six retorts.

These results show a vast superiority over anything obtainable from coal. I am sorry to see the naphtha committee failed to make a report. It seems to me they might easily have gathered the facts, either by visiting the works, or by corresponding with those who were successfully manufacturing the gas. They might easily have ascertained the yield, and the labor employed, the main items—or have prepared a letter of inquiry, in such terms as they saw proper, and sent it to the managers throughout the country, where the oil was known to be in successful operation. They did not seem animated with a very strong desire to find out anything about the matter, and it does not seem to me that the reasons that they have given through their chairman, by any means release them from the responsibility of not making a report.

Mr. Neal—The gentleman labors under a mistake. The committee were very anxious to find out the cos of the gas delivered to the consumer, and they did not succeed in finding it out. That is a very important thing.

Mr. Edgerton—Any company would show you their material results. They might not be willing to go into financial details of their operations, which are in one sense the exclusive property of the company; but I do not think you could find any manufacturer of oil gas who would not gladly give you his material results, and all the information necessary to form an intelligent opinion in regard to the production of the gas, the quality and cost of production—the cost of distribution has nothing to do with the question. I do not think any works would withhold from a committee of the Association, appointed for the express purpose of investigating the subject, any results or any information they might require in order to form a correct opinion.

I accompanied the gentleman through a number of works using oil in various ways, and the running details of the works were laid open to his inspection—all the accounts in fact we cared to examine.

I wish here to say a few words about the considerable difference in yield and quality reported by different authorities. The discrepancy is more considerable in the quality than quantity. It is stated very clearly in Mr. Patton's paper, that different grades of oil require different heats, meaning by grades—gravities.—That is, to get a favorable result from naphtha, you require a certain heat—from kerosene, a higher one, etc.

Carrying out this law, the most favorable results are obtained by the most careful fractionation of the oil; and hence it is, in my opinion, that the practically most complete fractionation of the material petroleum naphtha, gives about 33 per cent. greater results. In looking over a report, made to me five years ago by Prof. Wurtz, I find the experiments there quoted give about the same results, barring the difference just mentioned, as are now obtained on the large scale, where the fractionation is completely carried out.

The labor required is a great item of saving. In coal gas works 27 to 28,000 cubic feet per day per stoker is a large result. In an experience extending over several, I find the make per man of oil gas is about 70,000 cubic feet of 42 candle gas per stoker; coal gas, 27,000 cubic feet of 13 to 15 candle gas, is certainly a very disproportionate figure for labor. I would here again call your attention to the fact—that these are no experimental or estimated results, but hard, indubitable facts, and not like those of certain of our coal gas advocates who have dabbled in oil a little.

Their experiments are generally on a trifling scale, or they abound in theories.

Ours are practical, obtained from the successful manufacture of oil gas at 30 different works, some on

* The Mutual, of New York.

a very extensive scale, producing over 500,000,000 annually of oil gas, equal, say, to 2,000,000,000 cubic feet of coal gas. My deductions are founded upon the successful manufacture of this considerable amount of gas annually, and consequently cannot be called in question for want of practical basis.

The President—I will state to Prof. Edgerton that Prof. Chandler's assistants are here, and request that we will give them all the time possible to make their preparations for the lecture to be delivered before you this evening, at 8 o'clock.

I have a communication here from gentlemen in the city, inviting the members to partake of a complimentary dinner, at the Hoffman House, to-morrow afternoon at 2 o'clock, which was read.

On motion, the invitation was accepted.

A member—Some gentleman suggests that we cannot get through our business by 2 o'clock. Can't we leave the hour open?

Mr. Floyd—Mr. President: I would like to have you explain to the gentlemen why we extended the invitation.

The President—I think they all understand the situation in which the gas companies are placed by the death of Mr. Everett, in regard to this matter.

Mr. C. White—Some member suggested 8 o'clock in the evening. I think that is too late.

The President—Yes; I think that is too late. We will want to get home in time for breakfast.

The Secretary—We can get through with our business by noon, or, at furthest, by two o'clock.

A member—I think we had better leave the hour open, and then we will be able to-morrow to determine whether we can accept the invitation for 2 o'clock, or postpone it to a later hour.

The President—We ought to decide at once, if possible, so that there may be plenty of time to make the necessary preparations.

A member—We can determine that in the morning.

On motion, the hour was left open until the following day.

The President—The Secretary desires to read some figures in regard to the question under discussion, the manufacture of gas from petroleum.

Mr. Neal—Mr. Edgerton had the floor, and gave way for the question of allowing the assistants of Prof. Chandler to make pseparations for his lecture, and in regard to the invitation to partake of a dinner at the Hoffman House, and I do not think it would be courteous for any other gentleman to be allowed to take the floor, and speak upon the question under discussing until he has finished.

The President—He simply wishes to read some figures obtained from facts without discussing any of them.

The Secretary—The statements I am about to read may be of interest to members, and if they have pencil and paper and would take these statements down, they could analyze them at their leisure, and each could make his own calculations of the value, at his own place and market.

Statement of gas made by the Citizens Gas Company of Poughkeepsie, New York, during the month of September, 1875, and the materials used.

Anthracite coals, stove and grate size	36 1973 tons.
Bituminous coal	3·458 "
Crude petroleum	4,333 gallons
Coal tar, bbls. for fuel	55
Gas made	1,164,700 c. f.
By jet photometer	17.10 candle power.

The labor was performed by 2 men by day and two by night. Four men in all.

The following figures are the result of practical work in the city of Utica, under what is known as Lowe's Patent, recently introduced, and now in successful operation in that city. It was expected that Mr. Fish would be here to answer any questions that would be asked him respecting it, but he has not yet arrived I will now read the figures.

There was used at the works of the Utica company, N. Y., in the manufacture of gas under the Lowe process, during the month of September, 1875:

Anthracite coal, stove size	92·1955 tons.
Crude Petroleum	9,477 gallons
Gas made	3,050,600 c. f.
By jet photometer	20 candle power.

The labor was performed by two men by day and two by night.

The first of these results was obtained under the Gwynne-Harris process, and the last under Lowe's patent.

The President—Mr. Edgerton, will you continue your remarks, or will you give way until morning?

Mr. Edgerton—If there is no motion to adjourn, I will continue.

Mr. Neal—I move that we adjourn until 8 o'clock this evening, and that we reassemble at 10 o'clock to-morrow morning. Carried.

Mr. Harbison—I would like to inquire whether it is not possible to obtain a smaller room than this. It is absolutely impossible to hear much of the wisdom that is given out here, and we wish to get the benefit of the whole of it. This room is so large that some of us have great difficulty both in hearing and being heard. There are not enough of us present to require so large a room, and I think we should be much more comfortable if we could obtain a smaller one.

The President—I will see the officer of the building and procure a smaller room. This one is undoubtedly too large for the size of the audience.

The Association then adjourned until 8 o-clock in the evening.

EVENING SESSION.

OCTOBER 20, 1875—8 P. M.

The Association met pursuant to adjournment, and was called to order by the President, who said:

Gentlemen: Those who are present, though few in number, yet representing vast interests, have requested that a gentleman, a distinguished chemist and philosopher, should speak to you to-night on matters connected with our profession. He did not come here to speak to a large audience, but he did come here to tell us of facts in chemistry professionally known and acknowledged, which relate to our profession, so that the information he will lay before us can be carried home to every portion of our common country, and that we might know what learned men and learned chemists can tell us of the very nature of the article we are furnishing to the public; therefore, gentlemen, listen patiently. He is not delivering an address to the public, he is talking simply to men whose lives and whose studies are devoted to one common object. He is here to instruct us, and we are here to learn.

I have the honor to present to you Prof. Chandler, of Columbia College. (Applause.)

ADDRESS OF PROF. CHANDLER.

Mr. President and Gentlemen of the Association: I feel that there is a manifest impropriety in my undertaking to "instruct," to use the language of your President, this audience, which is supposed to represent all that there is known, practically, on the subject of gas in the United States, and I hesitated before I accepted this duty; but, being urged to do so, and being of a yielding disposition, I found entered upon my note book that I was to deliver an address before this Association to night.

My other engagements have rendered it impossible for me to prepare a special address for this occasion, nor have I had the time to search library and laboratory for novelties to present to you on this subject. All that I can undertake to do, is simply to turn over the leaves of my regular lectures on the subject of gas manufacture, which I deliver to the students of the School of Mines of Columbia College, and enlarge upon such points as may be of special interest. In doing this, speaking as I am, upon topics in regard to which you are far better informed than myself, I feel that I am constantly in danger of making mistakes in practical details which you will be only too quick to detect.

In the course of my regular lectures I introduced experiments which specially illustrate the subject to students, but I found, when I attempted to select experiments for such an audience as this, that there were very few which I could make, and they are so simple that they can hardly be considered appropriate for the occasion, still I will introduce them, trusting that they may be new to some of the audience.

It is interesting to consider the condition of mankind before the introduction of coal-gas, when wood fires, pine torches, and rushlights were the most convenient because the only means of obtaining artificial illumination. Lamps were finally introduced, but they were simply open smoky lamps in which crude animal, or vegetable oil, or petroleum was burned, without a chimney. They were burned by by means of a wick, and often when it was desired that the lamps should never go out, as in the temples, wicks of asbestos were used. The custom of maintaining fires or lamps which should never be allowed to go out, arose undoubtedly from the difficulty of kindling a fire without matches, or even steel.

The manufacture of candles was coeval with the persecutions of the early Christians. Forced to seek hiding places in the caves and catacombs, the want of artificial light was necessarily felt, and it is supposed that with them first began the use af modern candles. Even in the sixteenth century wax candles were used to a very limited extent, and as late as the year 1800 they were considered a great luxury. Cheaper candles were made of tallow with a twisted tow wick. At a later period spermaceti and stearic acid (1820) were introduced.

Among the first great improvements in lamps was the addition of a flat socket for the wick, which was made to move up and down by means of a horizontal spindle and toothed wheel, which could be turned by the fingers as required. This was known as the Worms lamp. A still greater improvement was the Argand lamp, which had a round hollow wick and a chimney. This improvement was made in the latter part of the eighteenth century. The Carcel lamp was introduced in 1800.

During those early times, either to secure safety from fires, or else to prevent political meetings, lights were extinguished by law at a certain hour at night. In fact, the curfew bell, which rang at 8 o'clock, was the signal of the authorities to the people to put out their lights and go to bed. This would seem to us a great hardship, but to our early ancestors it was comparatively of little consequence, for as they could neither read nor write, they had very little use for lights after that hour.

There is another phase of this question which is very interesting, and I will simply allude to it in passing. The advantage which we get from having our streets well lighted, was almost entirely unknown until the introduction of coal-gas. In early times, laws were enacted to compel persons to put lights in their windows in order to light the highways. In the fifth century the streets of Edessa and Antioch were lighted by dim lamps placed in the windows of the houses. In 1525 the English Parliament passed a law compelling persons who lived upon the street, to place lanterns in their windows. In 1716 this law was re-enacted and enforced, and it required lamps to be burned from 6 o'clock until 11, having a penalty for each failure to keep them so burning. An enterprising person contracted to do the work at six shillings per annum for each householder. In 1662 Laudati organized a corps of link or torch boys to accompany pedestrians at night, charging from three to five sous per half hour; the boys being provided with half hour glasses to mark the time. In 1667 Nicholas De Reynio, Lieutenant-General of Police in Paris, stretched chains across the street, and hung glass lanterns upon them. This marks an era in street-lighting. Still these lights seemed only to make darkness visible. They were oil lamps with one or two wicks, but no chimney. Accum stated to the House of Commons that two of their lights were equal to one "tallow dip." In fact, till our streets were lighted by gas, foot pads and burglars held sway during the hours of darkness, and single pedestrians rarely ventured out at night.

THE EARLY HISTORY OF GAS

About the beginning of the seventeenth century

Van Helmont noticed that when animal or vegetable substances were heated in closed vessels, vapors or spirits were obtained which burned with a bright flame. Sometime previous to 1691, Dr. John Clayton prepared gas from the bituminous coal of Wigan, collected it in bladders, and burned it for the amusement of his friends. In 1726 Dr. Stephen Hales made similar experiments with Newcastle coal, The Bishop of Llandaff showed in 1767 how gas evolved from coal might be conveyed in tubes, and in 1786 Dr. Pickel, Professor of Chemistry at Würzburg, lighted his laboratory with the gas obtained by the dry distillation of bones, In 1787 Lord Dundonald, of Culross Abbey, in Scotland, took out a patent for making coal tar, and erected ovens for the purpose. The coal gas produced was burned at the Abbey as a curiosity. The real inventor of practical gas-lighting was William Murdoch, who, in 1792, lighted his house and office at Redruth in Cornwall, with gas made from coal, and astonished his neighbors still more by adapting the new light to a small steam carriage in which he rode to and from the mines. He soon removed to Scotland, and in 1797 lighted his premises at Old Cumnock, in Ayrshire, with coal-gas. In 1798, he constructed gas works at the shops of Boulton, Watt & Co. at Soho, and first publicly exhibited the gas in 1802 at the Peace of Amiens, when he showed two enormous flames of coal gas, burning from two copper vases at these works. In 1805 the cotton mills of Phillips & Lee at Salford, were lighted with gas by Boulton, Watt & Co., under the direction of Murdoch; and at about the same time, the mills at Sowerby Bridge were lighted by the same firm, under the direction of Mr. Clegg. In 1799 the French engineer Le Bon took out a patent in France for making gas from wood, with which he proposed to light Paris. In 1804 Winsor lectured on gas at the Lyceum Theatre in London, exhibiting the gas but making a great mystery of the process. He finally obtained permission to light a few street lamps with gas in Pall Mall, which he did in 1809, and organized the National Light and Heat Company, applying for a charter, which was refused. A great newspaper war was then initiated by him, in order to create a popular interest in the new light. In 1810 Parliament authorized his majesty to grant a charter within three years.

On December 31, 1813, Westminster Bridge was lighted, and soon after the oil lights in the streets of St. Margaret's, Westminster, were replaced by gas, and the next year, 1815, Guildhall was lighted. Still, prejudice against the new light was so intense, even on the part of men of science, that it seemed at one time to present an insurmountable obstacle to its further progress. Davy (afterwards Sir Humphrey) ridiculed the idea by asking if it were intended to take the dome of St. Paul's for a gasholder. The popular ignorance with regard to gases in general, was so great that when gas was finally admitted into the House of Commons, the architect directed that the pipes be placed four or five inches from the walls lest their heat should fire the building. Popular prejudice was, by no means, the only obstacle to the introduction of gas-lighting. The apparatus and machinery had to be invented; men had to be instructed to make them, and others to use them. Suitable pipes for distributing the gas could not be obtained. Wood and paper were patented, gun barrels were screwed together, till, finally, wrought iron pipes were supplied. In 1822 there were four great companies in London, using 1315 retorts and 47 gas holders, and making 397,000,000 cubic feet of gas annually. Now, every large city in the civilized world is lighted by gas, giving rise, with the collateral business of making the fixtures, burners, etc., and working up the waste products, to one of the most extensive industries.

The manufacture of gas was first attempted in the United States at Baltimore without success, till 1821. It was introduced in Boston in 1822, and in 1823 the New York Gas-Light Company was started, though it was not in successful operation until 1827.

There are now probably 700 to 800 companies in the United States with an aggregate capital of $70,000,000 or more.

MATERIALS USED FOR MAKING GAS.

A great many materials have been introduced for the manufacture of gas, but, until very recently, coal has been the only material that bas been used to any extent on a very large scale. All vegetable and animal substances, when exposed in close vessels to a red heat, undergo destructive distillation, yielding gas, water, and tar and leaving a residue of charcoal or coke. A few only are adapted for the economical production of illuminating gas. Bituminous coal is the material generally selected, though under certain circumstances several others have been and are even now employed. The most important of these are petroleum or some of its less valuable products (as naphtha or residuum), rosin, wood, peat, cheap oils, and fats. The mixture of hydrogen and carbonic oxide called "water-gas," produced by passing steam over red hot coke, charcoal, or anthracite, or a mixture of steam and petroleum vapor or gas through a red hot retort, has been and is now employed with success in the manufacture of illuminating gas, its want of illuminating power being supplied by rich gases from other materials.

This subject is doubtless familiar to you all, though many of the figures I shall give were obtained some years ago by the officers of the Manhattan Company, a company which has always been foremost in making chemical investigations into the nature of the materials and products of this industry. They developed important facts concerning the character of the gas and the quantity obtained from different varieties of our ordinary coal. What we call caking coals, give us a considerable quantity of a rather low quality of gas, and Cannel coals give us a much richer gas as is shown by the table I have prepared here.

Coal-gas is made from bituminous coal. The following are the most important varieties of mineral coals:

1. Anthracite-
2. Bituminous—non-caking, caking, cannel.
3. Lignite, or brown coal.

In addition to these coals there are bituminous shales, such as Boghead mineral from Scotland, the "Hartley mineral" called by mistake Wollongongite from Australia, and the paper shales of Germany. There are also asphaltic minerals which, while they are never used alone are very important, when added to poor coals, to the extent of 5 or 10 per cent. as enriching materials for the purpose of improving the quality of the gas. The most important of these asphalts are Albertite from Nova Scotia and Grahamite from West Virginia. These asphalts produce large quantities of extremely rich gas, but their cost limits the quantity that can be used. Next to these in quantity and quality of the gas, come the rich bituminous shales above mentioned; but they too are not found in sufficient quantities to be used alone. Of true coals the cannels yield the richest gas, and in England they are sometimes used exclusively. The caking coal is, however, the chief material employed. The advantage of this variety of coal is due to its abundance, and consequent cheapness, and to the fact that, when heated, it undergoes a kind of fusion, and furnishes a compact porous coke of great value as fuel.

The gas from caking coal is inferior in illuminating power, but this deficiency is supplied by the use of a certain proportion of richer cannels and other enriching materials. The table which you see here illustrates the character of a few of the more important gas coals and enrichers.

The percentage of sulphur in gas coal, is a matter of considerable importance, as, while about half of this sulphur remains in the coke, the other half passes into the volatile products, and is divided between the gas, the ammonia water, and the tar. As the sulphur contained in the gas must be removed in the process of purification, the cost of this part of the process increases with the percentage of the sulphur contained in the coal. The sulphur is present in the coal chiefly in the form of iron pyrites. Some American gas coals contain considerable percentages of sulphur. The Nova Scotia coals (Glace Bay, Bridgeport, International, etc.), contain from three to five per cent.; Redbank, Pa., 0·89; Westmoreland, Pa., 1·50: Murphy's Run, West Virginia, 1·88 to 3·06; Orrell, England, 1·75 to 2·34. The last column in the table shows the number of feet of gas purified by one bushel of lime, which is a tolerable indication of the amount of sulphur which goes into the gas:

	Volatile matter	Fixed carbon.	Ash.	Gas per ton of 2240 lbs. in cubic feet.	Candle power of gas.	Coke per ton of 2240 lbs. Pounds.	Coke per ton of 2240 lbs. Bushels.	Gas purified by one bushel of lime, in cubic feet.
I. Caking Coals—								
Newcastle, England	32.70	65.55	1.75	10057	10.11	1536	49	3500
Glace Bay, Cape Breton	.....	.....	.....	9560	12.60	1484	38	1945
Lingan, Cape Breton	35.20	60.80	4.00	9520	12.92	1450	42	2200
Block House, Cape Breton	40.80	57.70	1.50	10217	17.32	1460	40	2304
Pittsburg, Pa.	36.76	51.93	7.07	10642	16.62	1544	40	6420
Westmoreland, Pa.	36.00	58.00	6.00	10528	18.81	1480	36	3993
Sterling, O.	37.50	56.90	5.60	10765	20.41	1540	36	2494
Despard, West Va.	40.00	53.30	6.70					
II. Cannel Coals—								
Kirkless Hall, England	40.30	56.40	3.30	10012	21.47	1410	36	2000
Darlington, O.	43.00	40.00	17.00	9800	34.98	1320	32	2806
Peytona, West Va.	46.00	41.00	13.00	13200	42.79	1380	32	4510
III. Enriching Materials—								
Boghead mineral, Scotland	51.60	15.70	32.70	13619	26.45	1378	35	3400
Grahamite, West Va.	53.50	44.50	2.00	15000	28.70	1056	44	
Albertite, Nova Scotia	57.70	41.90	0.40	14784	49.55	806	16.8	
Hartley Mineral, Australia	82.50	6.50	11.00	13716	131.00	424	.....	5686

THE MANUFACTURE OF COAL GAS.

The manufacture of coal gas includes three distinct operations: (1) The distillation of the coal. (2) The separation of the water, tar, and other condensable matter—*condensation*; (3) the removal of sulphur compounds and carbonic acid—*purification*.

The distillation of the coal is effected in the retort, which is a long, horizontal, semi-cylindrical vessel formerly made of iron, but now made of clay, in some localities being opened at both ends and charged at both ends, though generally they are charged at one end. They are set in groups or benches of three, five, six or seven, heated by one fire of coke. In Paris the Siemens regenerating furnace has been introduced for heating gas retorts. At the Vaugerard station one furnace furnishes fuel for 128 retorts, set in benches of 8, with regenerating chambers beneath each bench. The saving in fuel is said to be about 29 percent.

The work of charging the red hot retorts and drawing the coke is very laborious and exhausting, and an effective machine for performing this duty has been invented by Mr. T. F. Rowland of Greenpoint, N. Y., and is figured and described in the American Gas-

JOUUNAL of August 2nd, 1873. The working model certainly accomplishes all that can be desired.

The intensity and duration of the heat to which the coal is exposed, are matters of great importance. For iron retorts a dull cherry (1478° F.) to a clear cherry-red heat (1830° F.) is most suitable. For clay retorts a deep orange (2010° F.) to a clear orange (2190° F.) or even a white heat as (2370° F.) is employed, the coal itself being exposed in either case to 1500 to 1600° F. The effect of too low a temperature is to produce a larger proportion of condensable vapors, which are lost in the form of tar, while too high a temperature injures the quality of the gas by decomposing it into non-luminous marsh-gas and hydrogen. When the charge of 160 or 200 pounds of coal is first introduced into the hot retort, the outer layers only of the coal undergo distillation, yielding condensable vapors very rich in carbon; these, passing through the red hot retort on their way out, are decomposed into fixed gases of high illuminating power. As the heat continues, these outer layers of coal become converted into coke, which is soon raized to a red heat. In the meantime, the heat reaches the interior of the charge, and the vapors produced, passing through the red-hot layers of coke, are, in turn, conve ted into fixed gas. As each successive portion of vapor has to pass over a larger surface of red-hot coke, it is more and more completely decomposed, and its percentage of carbon, and consequently its illuminating power, reduced. For this reason, the quality of the gas deteriorates as the process of distil lation continues, till finally little besides hydrogen is evolved. At the last stages of the process, the sulphur contained in the coke is said to form bisulphide of carbon, which is a most objectionable impurity. It is considered better, therefore, to interrupt the process at the end of four hours than, by continuing it, to impair the quality of the whole product by the poor gases of the letter stages of the distillation. To prevent the reduction of the illuminating power of the gas by too high a temperature, it is also necessary to remove the gas from the retort as soon as possible, and not to permit its pressure to be increased by obstacles to its ready escape. For the accomplishment of this object an exhauster, or gas pump is employed, not so much to suck the gas out of the retort (the partial vacuum produced in the retort rarely exceeds one inch of the water-column in the pressure-guage) as to push the gas ahead through the condenser, washer, and purifiers into the holder, and thus make room for more gas to follow from the retort. The effect of too low heats is shown to an exaggerated degree in the comparison of results which you see on this diagram, obtained from the same coal when distilled at a bright red heat for gas, and at a heat hardly red (750° to 800° F.) for coal oil. One ton of 2240 pounds of Newcastle coal yieleed:

1. When distilled for gas, at a high temperature.		2. When distilled for oil, at a low temperature.	
Gas	7450 cu. ft.	Gas	1400 cu. ft.
Coal-tar	18½ gals.	Crude oil	68 gals.
Coke	1200 lbs.	Coke	1280 lbs.

THE CONDENSER.

The condenser consists of a series of iron tubes placed in the open air, or, more commonly, in cisterns of cold water. By a simple contrivance the tar and ammonia water which separate from the gas as it traverses the condenser, readily flow off into their respective wells. From 50 to 100 feet of tube surface is allowed for every 1000 feet of gas to be cooled per hour. At the works of the New York Gas-Light Company a multitubular condenser is in use, consisting of two sets of 8 boxes, each containing 100 tubes 3 inches in diameter and 15 feet long. The gas passes up in one set of tubes and down in the next, through the entire series of sixteen boxes, thus traversing 240 feet of 3-inch pipe, cooled by a constantly changing water supply outside. The action of this condenser is more than its name implies. While the warm gas contains steam and various condensable vapors, which are liquefied and separated here, it also bears along a considerable quantity of tar in the form of globules, spray or fog, too minute to be deposited by gravity. This tar is already condensed to liquid, and it requires for its separation actual contact with a bath of tar, as in the hydraulic main, or with surfaces wet with tar, as in the tubes of the condenser; the tortuous journey is also favorable to the *licking up* of the tar globules by the tarry surfaces.

THE WASHER.

The gas next enters the washer, and then, at many works, a scrubber, both designed to render more complete the separation of the tar and ammonia, and also to separate some of the sulphur compounds. The washer consists of a series of compartments through which the gas passes, and where it is exposed to jets of water. At the east-side works of the Manhattan Company, the washer consists of a series of 36 cells, 3 feet square and 10 feet high, each supplied with two jets of water, which enter at the side and are thrown into spray by impinging against an iron plate. The gas passes through the entire series.

THE SCRUBBER.

The scrubber is a large chamber partially filled with coke, fragments of fire brick or paving stones which are kept constantly wet by a spray of water.

APPARATUS OF ST. JOHN AND ROCKWELL.

I call your attention to an apparatus which has been brought into very successful use in this city, which it will be worth your while to see. It is the apparatus of St. John & Rockwell for taking the place of the ordinery washing apparatus. In the ordinary process the gas from the retort is passed through the condenser, washer, and scrubber. The object of the condenser is simply to cool the gas, and permit as much as possible of the tar and ammonia water to separate, the former by adhering to the surfaces the latter by condensation. The free use of water on gas is found to be objectionable, as some of the rich gases and vapors present are disso,ved out of it and the illuminating power is reduced thereby. For this reason dry scrubbing is sometimes resorted to, or washing and scrubbing with the ammonia water derived from the gas itself Messrs. St. John & Rockwell have devised an apparatus (figured and described in the AMERICAN GAS-LIGHT JOURNAL of January 16th and February 2nd 1875) which takes the place of condenser, washer and scrubber, and entirely avoids the use of any water save that condensed from the gas. It consists of a series of compartments by which the gas from the hydraulic main is made to bubble through the tar and ammonia water, and to pass over a lattice-work of corrugated plates of iron, which catches the tar globules.

I was called upon to investigate the working of this apparatus, and with my assistants superintended for a week, day and night, the Harlem Gas Works where this apparatus is now used, the results were extremely satisfactory. We used 163,120 pounds of Penn coal, and 470,445 Murphy Run coal, about ⅓ Penn coal and ⅔ Murphy Run, in all 633,565 pounds, which produced over 3,000,000 feet of gas. We found the average yield to be about 10,897 to the ton of coal in a week's run, and this gas being tested by the photometer, showed an illuminating power of 17·06 candles. 11,000 feet of 17 candles gas, from Murphy Run coal with an admixture of ⅓ of Penn, I considered a very satisfactory result. The gas is very clean. We found that it contained, after being purified with oxide of iron, only 2·65 grains of ammonia and 23·58 grains of sulphur in 100 cubic feet. Professor Wurtz, in the AMERICAN GAS-LIGHT JOUENAL, of January 2d, 1875, reported the results of his analysis of the gas before and after it passed this apparatus. The result is shown in this table. The numbers in the first two columns represent grains in 100 cubic feet.

	Crude gas from hydraulic main.	Gas after pasing the apparatus.	Percentage of each impurity removed.
Water	3515	2675	23.92
Tar	515	44	91.46
Soot, dust, etc.	266	56	79.05
Naphthaline	123	25	79.77
Ammonia	239	237	30.18
Sulphuretted hydrogen	1235	1105	10.51
Carbonic acid	1698	1522	10.36

The following report of the operations of this company for the past four months, shows that the method of separating tar and ammonia water still continues to give results fully equal to those I have mentioned:

	June.	July.	August	Sept.
Murphy Run coal used	2315500	2372100	2578800	3108800
Penn " "	92400	———	94200	———
Total coal used	2407900	2372100	2673000	3108800
Gas manufactured	12049000	12034000	13298000	18566000
Yield per pound	5.01	5.07	4.97	5.01
Photometric test	17.65	17.79	18.17	18.27

[To be continued.]

Obituary.

PREAMBLE AND RESOLUTIONS ON THE DEATH OF CHAS. C. MILES AND CORNELIUS L. EVERITT.

At a meeting of the Board of Directors of the New York Gas-Light Company, held on Thursday, October 21st, 1875, the Vice-President made the following announcement:

Gentlemen: I have the sad duty to announce to you the death of both of my official associates.

Our secretary, Mr. Charles C. Miles, died on Friday evening, October 15th, after an illness of about two weeks.

Our president, Mr. Cornelius L. Everitt, died on Sunday morning, October 17th, having been seriously ill about two weeks.

Of Mr. Miles I can only say that during the few years he had been with us, he had endeared himself to all with whom he came in contact, by his uniform courtesy and kindness, as well as by his fidelity and attention to the duties of his position.

He was appointed secretary of the company January 16th, 1871, and at the time of his death was forty-seven years of age.

Mr. Everitt entered the service of the company as clerk in 1827; was elected Secretary in 1842, Vice-President in 1861, and President in 1870, and at the time of his death was sixty-seven years of age.

His history is the history of the company; and so devoted was he to its interest, and so indefatigable in its service, that he scarcely had a separate existence. Always kind and courteous in his mnnner, careful of the rights and feelings of others, his memory will long be held in grateful remembrance by all who knew him.

The senier member of the Boaid then offered the following preamble and resolutions:

Whereas, It has pleased Almighty God to remove by death the President of this company, Cornelius T. Everitt, Esq.

Resolved, That we deeply regret in this event, the loss of a faithful and efficient officer, whose unswerving integrity and unfiring devotion to the interests of this company extended through a period of over forty-eight years; during which he passed acceptably from the lowest to the highest position in its service; through every grade of official responsibility.

Resolved, That by the death of Mr. Everitt, the members of this Board have lost an esteemed personal friend, and a courteous and agreeable associate, and our city a consicentious, upright and useful citizen.

Resolved, That a copy of these resolutions be transmitted to the family of the deceased, in whose affliction we deeply sympathize.

Which were adopted unanimously.

The same gentleman then offered the following preamble and resolutions:

Whereas, This Board has received with sincere regret the announcement of the decease on the 15th inst., of its secretary, Charles C. Miles, Esq.

Resolved, That we acknowledge the marked fidelity and ability with which our late secretary discharged his duties during his few years of service in the company, as well as his uniform courtesy and kindness to his associates in office.

Resolved, That we tender to his family our heartfelt sympathy in their severe bereavement.

Resolved, That a copy of these resolutions be transmitted to the family of the deceased.

Which were adopted unanimously.

On motion it was ordered that all the proceedings

connected with the death of our late President and Secretary, be entered upon the minutes.

Attest. THOMAS K. LEES, Vice President.
GEORGE W. DOANE, Assistant Secretary.

OFFICE OF THE NEW YORK GAS-LIGHT CO.,
NOS. 157 AND 159 HESTER STREET,
NEW YORK, October 23, 1875.

At a meeting of the clerks in the general office of the above company, the following preamble and resolutions were unanimously adopted:

Whereas, It has pleased Almighty God in his infinite wisdom, to remove by death the President of this company, Cornelius L. Everitt, Esq.; with whom some of us have been associated for nearly a quarter of a century, and are thus competent to bear testimony to his worth, desiring to give expression to our unfeigned sorrow and regret.

Resolved, That in the decease of our President, each of us has lost a personal and valued friend.

Resolved, That we bear testimony to his fidelity as an officer; to his conscientious rectitude and probity; to his watchfulness and carefulness of the interests of the company with which for nearly half a century he was identified.

Resolved, That we will ever hold in grateful remembrance his many virtues as a Christian gentleman, and endeavor to profit by the example he has shown us of diligence in business and a conscientious discharge of duties.

Resolved, That we deeply sympathize with the family of the deceased, and fervently pray that this dispensation of God's providence may be sanctified to them; and

Whereas, It is with sincere regret that we have also to lament the death and removal from among us of our late secretary, Charles C. Miles, Esq., whose decease took place on the 15th inst., therefore be it

Resolved, That in this dispensation of God's providence we have lost a good executive officer, whose courteous demeanor and universal kindness endeared him to those associated with him in the duties of the office.

Resolved, That we tender our heartfelt sympathy to the bereaved family, and pray that He who is the husband of the widow and father of the fatherless, may comfort and sustain them.

Resolved, That a copy of these resolutions be presented to the families and published in the papers.

THEO. N. PEETS,
CORNS. P. ROSS, } Committee.
J. MCKEOWN,

CHAS. BAKER, Secretary to the meeting.

Gas-Light Intelligence.

United States.

In our issue of October 16, we stated that the jury in the case of Martha Hutchinson against the Boston Gas-Light Co., had awarded damages in the amount of $12,500 to the plaintiff for personal injuries received at the time of the fire in 1872, by a gas explosion in Summer street. We are now informed upon reliable authority that the Judge reversed the verdict of the jury, as not being in accordance with the law and the facts. We have not learned whether the case is to be appealed or not.

Great Britain.

METROPOLITAN GAS.—Dr. Letheby, the Chief Gas Examiner appointed by the Board of Trade, has recently reported to the city authorities and to the Metropolitan Board of Works the results of the daily testings of the gas supplied to London by the Chartered, the Imperial, and the South Metropolitan Gas Companies during the last three months. The illuminating power, he states, has been ascertained by burning the gas at the rate of 5 feet an hour from a Sugg's London argand, in the case of the common gas, and from a bat's-wing burner in the case of cannel gas. The results of the nine testing places have been as follows: Chartered gas; Beckton, equal to 17·88 standard sperm candles; at Friendly Place 16·45 candles; and at Ladbroke Grove, 16·88 candles. Imperial gas: Carlyle Square, 16·92 candles; Camden street, 16.19 candles; Graham Road, 16·87 candles; and Bruce Terrace, 16·11 candles. The Syuth Metropolitan gas, 16·12 candles; and the cannel gas of the Chartered Company, 21·41 candlhs. These results show that the illuminating power of the gas has been above the requirements of the Acts of Parliament. As regards impurity, Dr. Letheby reports that the Chartered gas at Beckton contained traces of sulphuretted hydrog n on eight occasions, but at all other stations the gas was quite free from this impurity. The average proportions of sulphur in the gas were 11·32 grains per 100 cubic feet at Beckton, 8·92 grains at Friendly Place, 11·77 grains at Ladbroke Grove, 9·24 grains at Millbank, 16·13 grains at Carlyle Square, 11·37 grains at Camden street, 7·61 grains at Graham Road, 10·48 grains at Bruce Terrace, and 13·61 grains at Hill street, Peckham. On one occasion at Beckton, and on two occasions at Bruce Terrace, the gas contained an excess of sulphur (over 15 grains per 100 feet); and on two occasions at Hill street the proportions of sulphur exceeded 20 grains per 100 feet. The cause of this excess in the gas at Beckton and at Bruce Terrace, as well as the presence of sulphuretted hydrogen in the Beckton gas, has been the subject of investigation, and Dr. Letheby finds that it was due to accidental circumstances. The proportion of ammonia in the gas has never reached the prescribed amount of 2·5 grains per 100 feet, the averages at the several testing places being from 0·02 of a grain to 1·47 grains per one hundred feet.

Chemical and Scientific Repertory.

The mordants used for dyeing with sumac are either tin, acetate of iron, or sulphate of zinc. The first gives yellow, the second gray or black, according to strength, and the third greenish yellow.

A mixture of peroxide of manganese and water glass is recommended to be applied to cooking stoves when they are red hot, as it is said to make a good blacking, not as liable to burn off as common black lead.

A good cement for chemical and electrical apparatus may be prepared by mixing 5 lbs. rosin, 1 lb. wax, 1 lb. red ochre, and 2 ozs. plaster of Paris, melting the whole with moderate heat.

To prevent condensation in a steam pipe laid under ground, place it inside another larger pipe, filling the intervening spaces with pulverized charcoal. The outside pipe should be watertight.

A cement, impermeable by air and steam, and especially well adapted to use for steam or gas pipes, is made of powdered graphite 6 parts, slaked lime 5 parts, sulphate of lime 8 parts, and boiled oil 7 parts, well kneaded.

Cider may be preserved sweet for years, by putting it up in airtight cans, after the manner of preserving fruit. The liquor should be first settled and racked off from the dregs, but fermentation should not be allowed to commence before canning.

When boilers are ordinarily fed with hard water, it is worth while to save the drippings of the exhaust pipe, the condensation of the safety valve blow off, and that from the cylinder, and use the water thus obtained to fill the boiler after blowing off. The result will be surprising in effect in loosening scale.

CANDLE-WICK GAS.—The composition of this smoke is carburetted hydrogen, carbonic oxide, burnt olein, etc. When putting out a candle light before going to bed, always do it so that there shall be no burning wick left to poi on the air of the room.

NEW METHOD OF DETECTING ADULTERATION OF FATTY OILS.—M. Roth employs, as a re-agent for the above, sulphuric acid at 46° B. saturated with nitrous vapors by causing nitric acid to act upon large pieces of iron. At the end of six or eight days the solution acquires a fine bluish green color, indicative of complete saturation. This re-agent solidifies either partially or entirely the olein of non siccative oils. The purity of the oil may thus be determined by noting the time which it occupies in solidifying.

DETECTION OF PICRIC ACID IN BEER.—For this purpose Brunner recommends acidulating the beer with hydrochloric acid, and plunging therein a fragment of woolen thread, and digesting the same in a *bain marie*. After the thread is removed it is heated with a solution of ammonia. The latter is filtered, evaporated in a *bain marie* to small volume, and a few drops of cyanide of potassium are added. The presence of 0.015 grain of picric acid in a pint of beer is determined by a red color being produced, due to the formation of isopurpurate of potash.

The French papers speak of a method of rendering paper extremely hard and tenacious by subjecting the pulp to the action of chloride of zinc. After it has been treated with the chloride it is submitted to a strong pressure, thereafter becoming as hard as wood and as tough as leather. The hardness varies accordingly to the strength of the metallic solution, the material thus produced can be easily colored. It may be employed in covering floors with advantage, and may be made to replace leather in the manufacture of coarse shoes, and is a good material for whip handles, the mounting of saws, for buttons, combs, and other articles af various descriptions.

TINNING IRON WIRE.—The following is M. Heeren's process for giving iron wire the appearance of silver. This is done by a thin film of tin. The iron wire is first placed in hydrochloric acid, in which is suspended a piece of zinc. It is afterwards placed in contact with a strip of zinc in a bath of two parts tartaric acid dissolved in 100 parts of water, to which is added three parts of tin salt and three parts of soda. The wire should remain about two hours in this bath and then be removed, and made bright by polishing, or drawing through a polishing iron. By this galvanic method of tinning, wire which has been wound in a spiral, or iron of other shape, can be made quite white, which is an advantage over most other methods, where the wire is tinned in the fire and then drawn through a drawing-plate.

ROSINA, A NEW DYE.—A very interesting new dyestuff has been prepared by Dr. Caro, chemist of the celebrated Badische Actein Soda Fabrik, Stutgart, Germany. Prof. Bayer proved, several years ago, that when phtalic acid, obtained by the oxidation of naphthalin, and resorcin, which is prepared by heating assafœtida with alkalies, are heated together, a highly fluorescent substance, fluorescein, is formed, from which by treatment with reducing agents, flourescine, a colorless base, is deriven. By treatment with bromine, and combination with potash, the new dyestuff is obtained, which is called cosine, from the Greek word cos, the down. The solutions of this substance in alcohol and water appear of a delicate rose color in transmitted, and a pure yellow color in reflected light. On wool the shades produced resemble cochineal, as also on silk. On the latter fibre the dye retains its remarkable dichroism, showing red or yellow according to the direction in which it is viewed. Unfortunately, the new dye is very expensive, costing at present about $100 gold, per pound.

NEW METHOD OF PREPARING VERMILLION.—Recently much attention has been given to the study of this interesting and beautiful compound of sulphur and mercury, the methods of preparing it, and the effects of light and of metals, especially copper and brass, upon the color. Among other interesting results of these studies is the discovery of a new and convenient method for its preparation in the wet way. O. Hausamann has published the following method: A solution of corrosive sublimate is poured into an excess of dilute ammonia, forming a white precipitate of ammonia-mercuric chloride. This precipitate forms flakes which settle to the bottom, and the su-

pernatant liquor contains chloride of ammonium and the excess of ammonia. The precipitate is stirred up with this liquor, and enough of a concentrated solution of hyposulphite of soda is added to dissolve the precipitate, and a little more. On warming the solution in a capsule vermillion at once begins to separate; the heating is continued until a thin pasty mass is obtained. Vermilion produced at a temperature of 120° to 140° Fahr. is of a lighter color than that produced at 200° or 212°. The most beautiful pigment was formed at 160° to 175°.

Iron Mak ng in Japan.—Messrs. Head, Wrightson & Co., of the Teesdale Iron Works, Stockton-on-Tees, have just entered into a contract with the Japa nese government to supply the whole of the necessary plant for two blast furnaces which are to be erected at the Heygori mines, in the north of Japan, where it is sa d that a rich ore c ntaining 50 per cent. of metallic iron exists. These will be the first blast furna ces constructed in that part of the country. The professional adviser of the government is Mr. David Forbes, F.R.S., of London, a secretary of the Iron and Steel Institute. The furnaces will be 37 feet high, 10 feet in the bosh, for charcoal, and will be fitted with Whitwell's patent charging apparatus, aod all the most modern appliances in this department of engineering.

Water-Supply.

We understand that the National Tube Works company, of Boston, have just been awarded a gold medal on the merits of their Lap-welded Enamel Water Tubing, which seems to be meeting with success.

Peekskill Water Works.—Over one hundred men are employed on the reservoir to furnish the village of Peekskill with pure water, and the contractors expect to have the work finished in two months. Four acres of ground have been excavated and walled with rip rap, and the reservoir will have a capacity of 26,000,000 of water. In the village all the pipes have been laid in the streets, and the necessary pumps have been constructed. At Canoper's Creek a large building for the reception of the machinery to pump the water has just been finished, and all the machinery is in working order. The water is forced through mains a distance of over a mile up an elevation of 350 feet to the reservoir, whence it is distributed to the village, a mile away. The cost of the work will amount to about $200,000.

Jamaica Water Works.—One of the most important works being carried out in Jamaica (British West Indies) is the construction of new water works for the improvement of the water supply of the city of Kingston. In the carrying out of these works a dam across the Hope river has been constructed, for the purpose of increasing the quantity of water flowing into the culvert. Two reservoirs, at the termination of the the culvert near the city, are in course of construction, They will contain five million gallons of water. Two filter beds have also been constructed. From the reservoirs the water will flow into the city and its suburbs by a system of iron pipes. The main pipe is 21 nches in diameter.—*Builder.*

Metropolis Water Supply.—The Registrar General publishes the following returns of the average daily quantity of water supplied by the London water companies during the month of August, 1875. According to their returns, 125,186,508 gallons, or 568,780 cubic mètres of water (equal to about as many *tuns* by measure, *tons* by weight) were supplied daily; or 241 gallons (109·5 decalitres), rather more than a *ton* by weight, to each house, and 33·9 gallons (15·4 decalitres) to each person, against 35·1 gallons during August, 1874. According to the returns of the London water companies made to the select committee on East London Water Bills (session 1867), it is estimated that, during the year 1866, about 82 per cent. of the total supply of water for all purposes was for domestic use. Applying this proportion to the total quantity supplied daily in the month of August, 1875, it may be estimated that about 102,652,637 gallons were used for domestic purposes, or about 27·8 gallons per day for each inhabitant, against 28·8 in the corresponding month of last year. This proportion varies from month to month, but the Registrar-General has no means of giving a more reliable estimate.—*London Journal of Gas-Lighting.*

Giornale del genio civile, Rome.—Beyond the official matters contained in this are several original articles of considerable interest to civil engineers, among which the studies of Sig. Vescovaii on the hydrometric conditions of the Tiber form a carefully-written essay. He advocates improving the present bed of the river and improving its outflow to the sea, in reference to the construction of any new channel. Inundation has been a plague to the inhabitants of Rome from before the time of Augustus; whether Italy will be able yet awhile to spend on impr vements in the Tiber the twenty million francs which Sig. Vescovali asks for may be doubted

The Channel Tunnel.—The soundings for the submarine tunnel between England and France are being carried on actively. They are at this moment directed to the part of the straits near the English coast, at a few miles from the shore. Each evening the vessel which carries the commissioner returns to Dover, Calais, or Boulogne, and work is recommenced the next day. The engineers charged with the important labor are perfectly satisfied with the results obtained. So far nothing has occurred to destroy their assumptions relative to the depths.

Improvements in Safety-Lamps.

The invention of Mr. A. B. Boullenot, of Paris, consists in replacing the Davy or safety-lamps ordinarily used in mines containing fire-damp by improved lamps supplied with air from outside the mine. For this purpose a fixed pipe or pipes is conducted down the mine and branches from it are led into all the workings.

Compressed air is forced down the pipe by means of air-pumps worked at the surface, and the improved lamps are screwed to the air-pipes, where necessary, by means of couplings and straight or elbow pipes provided with stop-cocks. The improved lamp consists, first, of a metal air-vessel which receives the compressed air, and into the upper part of which an oil-vessel drops, fitted with a burner, and a wick (either flat or tubular) which can be raised or lowered by means of a nob outside the lamp. This nob can be disconnected from the oil vessel when it is required to remove the latter. Above the air-vessel is cemented a tube or cylinder of glass or crystal, the upper end of which has fitted round it a metal ring carrying a cover formed of two pieces of wire gauze a short distance apart. The glass cylinder is protected by a cage of sufficiently strong metal bars. A reflector is provided carried by a ring fitting round the air chamber and movable into any desired position.

Through the centre of the gauze cover an opening is left which can be closed by a stopper, and through this opening a light can be introduced consisting of a tube or sheath containing an inner spring clip, which can be raised or lowered by a ring or handle at the top of the tube from outside the lamp. This spring clip carries a match, which can be ignited by rubbing its end upon a rough surface prepared for the purpose at the top of the oil vessel. When the match is ignited the lamp wick is lighted from it, and the match is then extinguished by drawing the spring clip into the tube, which can then be removed from the lamp, the opening in the cover being closed by its stopper; and the lamp will then continue burning so long as the supply of oil and air continues. A valve may be provided in the cover. When necessary this improved lamp may be screwed to a portable receiver of compressed air or oxygen, instead of to a fixed air-pipe.

Correspondence

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—Ed.

Mr. Patton's Answer to Mr. Allen,

Trevorton, Pa., November 2875.

Mr. Editor: Ignoring utterly the difference between an incidental portion of a manufacture and a separate manufacture itself, which in this case is as plain as the difference between raising a crop of straw well filled with wheat, and raising another crop with empty heads, Mr. Allen has seen fit to return again to the attack that he made on me during the last meeting of the American Gas-Light Association, and by confounding a genuine article with a specious imitation, he endeavors to discredit a statement that I made there, which is somewhat damaging to the value of certain patents.

"There are none so deaf as those who will not hear"; and while I fear the effort will again be vain, so far as Mr. Allen is concerned, there may be yet some members of the gas fraternity who want to hear again in substance, that gas which will not give any light is not worth any money for illuminating purposes.

If there is any one beside, Mr. Allen who has a contrary belief, I should like to hear from him; but really this reiteration from a solitary source of a statement, the substance of which is that worthlessness is value, and that any person who says it is not is untruthful—is becoming somewhat monotonous.

The valueless and injurious elements are bad enough and plenty enough in any gas, as every gas engineer knows, and should be eradicated as far as is economically practicable. But when I spoke of dilutants, I trust that no intelligent gas engineer understood me to refer to such as are, under our present methods and knowledge of gas manufacture, either from oil or coal, inseparable from its production.

Such judgment as I have in the matter even sanctions the use, in deference to established ideas and customs of a possible means of dilution, as stated in my article and read before the Association; *provided* that such means could be *produced and used* in a sufficiently pure state, and at a very low cost.

But even then I would consider the money spent in the production of such a dilutant, as a tribute to established usage and invested capital, and not to its real usefulness. Upon such belief I have based the statement as I made it, and until it can be shown that any of the various attempts to manufacture an *imitation coal gas*, out of either greased wind or oiled water, has proved to be an abiding success, I shall continue to look upon all such attempts as affecting petroleum gas very much as "The old man of the sea" did Sinbad the sailor, and shall endeavor to rid the oil gas system in general of all such riders and parasites, and to allow it, untrammeled by them, to take such place in the great field of public illumination as its real merits entitle it to.

It is especially noticeable that all the various attempts to make a non-illuminating gas do the duty of an illuminating gas, depend entirely upon petroleum in some form or condition to furnish the illuminating power, and not unfrequently are christened "Petroleum Gas Apparatus"; and in that way bear testimony to the ability of petroleum to make light, but they fail utterly to show any value in themselves apart from the petroleum, or to explain why, since petroleum gas can be made and used alone, any complicated or expansive apparatus is needed as an auxilliary.

Yours respectfully,

J. Desha Patton.

Consumption of Forests.

It is said that nearly one-half of the surplus hard woods of the country are to be found in Western Virginia. How long these will last is a doubtful ques

tion. Taking the one item of rail road ties, and we find that the country requires for its annual supply 94,530,000 cubic feet, equal to 738,515 cords of solid timber, to secure which at least 2,000,000 cords of standing timber have to be cut down. The average product per acre of the forests of Virginia is given by M. F. Maury at from 40 to 50 cords per acre; so that taking the maximum yield, our railroad ties alone destroy annually 40,000 acres of woodland. The annual consumption of the country for fuel is estimated at over 50,000,000 cords of wood, of which three-fifths may be assumed to be good standing timber cut expressly for fuel. This gives an annual clearing of 600,000 acres. The iron foundries consumed in 1870 635,000 tons of charcoal, and a furnace that makes six or seven tons of iron a day will use up 200 acres of woodland in a year. The annual product of charcoal iron is now about 200,000 tons, using up 5,000 acres a year. The pine lands of Michigan, the best in the country, yield 10,000 feet to the acre, board measure. The annual consumption of the country in manufactured lumber is 20,000,000,000 feet, representing an annual clearing of 2,000,000 acres. The fencing of the country required 25,000,000 acres to be cleared in order to make it, and the annual repairs to fencing destroy 2,500,000 acres of forest. Our shipping tonnage represents 80,000 acres of oak forrest destroyed, and demands for repairs 4,000 acres a year. The hard and turned wood manufactures of the country use up an annual average of 300,000 acres of timber. Taking all these items together, we have an aggregate annual consumption of 5,500,000 acres of forest. As our total forest-lands amount to 380,000,000 they will last at this rate only seventy years, A certain percentage of forest destroyed is allowed to renew itself, and, as in seventy years a pine woods can be cut over twice, this renewal amounts to a very considerable figure, but it is scarcely sufficient to offset the increasing demand for timber for every purpose to keep pace with increasing population and exigent industries in the same period. In other words, with our present system of husbandry and our present growth of population, seventy years marks the maximum period that our forests may be expected to hold out;—*New York World.*

Experiments on Gases under High Pressures.

M. Andrews.—The distinction commonly made between a gas and a vapor rests on a basis perfectly arbitrary, and without scientific value. The author proposes to call vapor every gas considered at any temperature whatsoever beneath the critical point—that is to say, the temperature at which one cannot, by pressure alone, reduce the gas to the liquid state.

According to this definition, carbonic acid is a vapor below +·90°, a gas above that temperature. He has examined the properties of mixtures of nitrogen and carbonic acid under high pressures and at different temperatures. In these experiments he has gone as far as 284 atmospheres, and finds that under such circumstances the law of Dalton for gaseous mixtures does not apply. The critical point of the condensable gas in the mixture lowers, and that so much the more as the mixture contains more of an incondensable gas. Thus, in a mixture of three volumes of carbonic acid and four volumes of nitrogen, no liquid appeared at any pressure until the temperature had been reduced to −20°.

In operating at temperatures above the critical point, the author has subjected carbonic acid to pressures increasing from 17 to 224 atmospheres. This gas shows great deviations from the law of Boyle or of Mariotte, and these deviations increase as the temperature lowers. The deviations from the law of Gay-Lussac presented by carbonic acid under high pressures have a great interest. The value of the coefficient of expansion (a) increases with the pressure in a manner truly remarkable. Thus, with a pressure of 40 atmospheres, and between 6° and 63·6°, a=0·00945, *i. e.*, a little more than 2½ times as much as under the pressure of one atmosphere. At constant pressures, the value of a changes with the temperatures. In a word, the value of a, as coefficient of the elastic force, increases with the pressure and changes with the temperature.—*Chemical News.*

NOTE.—All degrees of temperature are Centigrade, unless otherwise expressed.

American Patents.

IMPORTANT NEW ORDER OF COMMISSIONER OF PATENTS.—The acting Commissioner of Patents has recently issued the following order:

UNITED STATES PATENT OFFICE,
WASHINGTON, D. C., September 29, 1875.

Employees of the office have been strictly prohibited, under penalty of dismissal, from furnishing copies of official records except when ordered through the regular official channel. It is understood that the practice has grown up partly because of the difficulty in procuring copies by regular order when required for immediate use. That no such inconvenience may arise, orders for copies needed immediately will, upon special request, be made specially and filled at once.

ELLIS SPEAR, Acting Commissioner.

Patents issued for week ending Oct. 26, 1875:

	Class.	Number.
Ventilating Buildings—L. R. Satterlee, Rochester, N. Y.; filed June 17, 1875	166	169,300
Hydrant—Pease & Campbell, Cohoes, N. Y.; filed May 17, 1875	167	169,288
Manufacture of Illuminating Gas—Jos. W. Beatley, Brooklyn, N.Y.; filed Oct. 20, 1875	66	169,326

Patents issued for week ending Nov. 2nd 1875.

Water Meter—W. B. Mounteney, Chicago, Ill., filed Sep. 1, 1875	167	169,368
Liquid Fuel Burner—Geo. H. Perkins, Phil. Pa., filed July 27, 1874	90	169,372
Apparatus for Lighting and Extinguishing Gas—Green & Barrow, England; filed Sept. 17, 1875	64	169,352
Apparatus for regulating the flow of gas to burners—Jacobson & Murphy, N. Y.; filed Sep. 22, 1875	64	169,549
Water Supply Apparatus—J. N. Poag, Cincinnati, Ohio; filed October 25, 1875	167	169,577
Reverberatory Furnaces—J. Price, England; filed August 2, 1875	85	169,581
Hydrocarbon Furnaces—Peter M. Quist, St. Paul, Minn.: filed September 18, 1875	149	169,581
Gasalier Drop Light—J. Fox, N. Y. city; filed Sept. 20, 1875	64	169,430
Hydrant—W. D. Greanell, N. Y.; filed Sept. 14, 1875	167	169,538

Patents issued for week ending Nov. 9, 1875.

Air Blowing Apgaratus for Carburetors—C. M. Georing- Pittsburgh, Pa.; filed August 11, 1875	27	169,802
Carburetting Apparatus—A. C. Rand, Minneapolis, Minn.; filed Oct. 4, 1875	27	169,843
Carburetting Apparatus—P. Werni, Philadelphia, Pa.: filed April 13, 1875	27	169,872
Gas Machine Retort—Van Kannel & Towsley, Cincinnati, O; filed August 31, 1875	66	169,747
Automatic Check Valve for Gas Machines—Van Kannel & Towsley, Cincinnati, O.; filed Aug 31, 1875	66	169,746
Manufacturing of Illuminatiug and Heating Gas—G. W. Harris: filed October 7, 1875	67	169,637
Process and Apparatus for Decarbonizing Gas Retorts—D. Davidson, N. Y.; filed Nov. 11, 1875	66	169,628
Apparatus for Lighting Railway Cars—J. F. Randolph, Indianapolis, Ind.; filed Jan. 20, 1875	64	169,658
Aero-Gas Burner—S. H. Knight, Boston, Mass.; filed April 23, '75	65	169,711
Water Supply and Vent for Traps—J. H. Morrell, New York; filed October 1, 1873	167	169,722
Water Filter—E. S. Farson, Philadelphia, Pa.; filed April 26, '75	167	169,631
Hydrant—Stacy & Lewis, Cincinnati, O.: filed August 28, 1875	167	169,738

Determination of Mixed Oils.

Translated by S. A. Goldschmidt, Ph.F.

The testing of mixed oils is far from being a certain operation. The following, however, are the principal means of determining the presence of mixtures.

First.—The determination of its specific gravity at 15°Centigrade, and its comparison with the following table:

	Density	Degrees on Alcoholometer.	Weight of 1 hectolitre
Tallow oil (oleine)	900·3	73°	88·40
Colza(winter strained)	915°	59·8	91·50
" (summer ")	916·9	59·8	91·67
Rapeseed (winter strained)	915·4	59·5	91·54
Rapeseed (summer strained)	915·7	59·2	91·57
Earthnut (arachides oil)	917°	58·5	91·70
Olive	917°	58·5	91·70
Almond	918°	58°	91·80
Beechnut	920·7	57·5	92·07
Sesame	923 5	56°	92·35
Whale	924°	55°	92·40
Poppy	925·3	54·5	92.53
Hempseed	927°	53·5	92·70
Codliver	927°	53·5	92·70
Cottonseed	930·6	52°	93·06
Linseed	935°	50°	93·50

2d. Chlorine turns animal oils brown, and vegetable oils white. The former are soluble and the latter insoluble in ether.

3d. To discover an adulteration of oil by oil sesame, shake 5 grammes of sulphuric acid with 5 grammes of nitric and 10 grammes of the suspected oils; if mixed a grass-green color is immediately developed.

4th. To find if olive oil is mixed with any unknown oil, mix 50 centimetres of the oil with 10 centimetres sulphuric acid. If the olive is pure there will be a rise of 42°. If mixed the temperature will be

58° for oil of colza.
65° for beechnut.
68° for sesame.
98° for hempseed.
133° for linseed.

5th. The production of a black hue in the lower part of the test-tube, after agitating 20 drops of an alcoholic solution of nitrate of silver with 10 grammes of oil and 20 grammes of ether, the flask being kept in the dark, shows the presence of rapeseed oil.

6th. The most difficult adulteration to be detected is that of olive and earthnut oil. These oils have the same density, congeal at the same temperature, and are acted on by sulphuric acid in a similar manner. They can, however, be distinguised as follows:

Dissolve cold 12 grammes of mercury in 15 grammes of nitric acid of 38°. Mix this with 90 grammes of the suspected oil, and agitate often during two hours. If the olive oil is pure the mixture will become homogeneous. If not, and especially if the mixture becomes filled with carboniferous streaks, the presence of the oil of arachides may be reported.—*Moniteur des Produits Chimiques.*

Electricity and Life.

Electricity, about which so little is really known, the wonderful possibilities of which have scarcely begun to be developed, has been lifted, by scientific investigation, high above the region of charlatanism, and placed upon the list of positive remedial agents. Why the electricical current when passed from the nerve-centres along the various branches, is competent to reduce irritation and allay pain, we can only conjecture. The fact exists, however, and the sufferer is more nearly interested in the fact than in the cause. No phenomena are more closely investigated than the electrical, and none are the subjects of wider discussion. The question, "Is Electricity Life?" has been answered affirmatively by many of the leading scientific minds of Europe: and the researches of the most eminent electricians substantiate the fact that a current, precisely akin to that generated by the decomposition of metals, exists in our muscles

☞ *For other reading matter see page* 190.

THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY.

Publishing Office, No. 42 Pine Street.

PUBLISHED ON THE 2ND AND 16TH OF EACH MONTH

At No. 42 Pine Street, New York.

A. M. CALLENDER & CO.,

PROPRIETORS.

Editor—G. WARREN DRESSER.

This is a recognized official organ of—

LIGHT, HEAT, MINING INTERESTS, STEAM, WATER-SUPPLY, PATENTED INVENTIONS, VENTILATION, SANITARY IMPOVEMENT, AND GENERAL CHEMICAL SCIENCE.

TERMS

SUBSCRIPTION—Three Dollars per annum, in advance.

AGENTS:

NEW YORK—AMERICAN NEWS COMPANY, 119 and 121 Nassau St
BOSTON—S. M. PETTENGILL & Co., 6 State Street.
PHILADELPHIA—COE, WETHERILL & Co., Ledger Buildings, Phila.
Germany—B. WESTERMANN & Co., of New York.

☞ All communications to be addressed to **"The Proprietors,"** No. 42 Pine Street, Room 18, New York.

THURSDAY, DECEMBER 2, 1875.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 119 and 121 Nassau street, New York agents for this Journal. News dealers will please send orders to them.

NOTICE.

☞ *All Collections for Advertisements, Subscriptions, etc., are made directly from this Office. We have Agents to solicit the same, but they are not authorized to Receipt for Money.*

TO OUR SUBSCRIBERS AND PATRONS.

In making remittances for subscriptions, always procure a draft on New York, or a POST OFFICE MONEY ORDER, if possible. Where neither of these can be procured, send the money, but always in a REGISTERED LETTER. The registration fee has been reduced to eight cents, and the registration system has been found by the postal authorities to be actually an absolute protection against losses by mail. ALL Postmasters are obliged to register letters whenever requested to do so.

CONTENTS.

☞ An asterisk (*) denotes an illustrated article

Third Annual Meeting of the American Gas-Light Association.....201
Obituary—Death of Chas. G. Miles and Cornelius Everett.204
Gas-Light Intelligence.....205
Chemical and Scientific Repertory.....205
Water-Supply.....206
Improvements in Safety-Lamps.....206
CORRESPONDENCE—
Mr. Patton's Answer to Mr. Allen.....206
Consumption of Forests.....206
Experiments on Gases under High Pressure.....207
American Patents.....207
Determination of Mixed Oils.....207
Sewer Gas at the Best End of Towns.....210
Specifications of French Patents.....210
EDITORIAL—
Thanksgiving.....208
M. Bazin's Dredging Machines.....208
Light.....209
Hon. Henry Wilson.....20
The Mindeleff Reduction Process.....209
Our Report.....209

THANKSGIVING.

During the past week throughout the length and breadth of our land, at the request of the Chief Magistrate of the Nation, and of the governors of the states, our people have again been called upon to return thanks to the Giver of all Good for the many blessings of the past year. This is a custom that should never be departed from. We are too apt to take what we can get without stopping to consider that at least common courtesy would require us to acknowledge that Good cometh not of ourselves alone. The customs associated with the annual thanksgiving vary in different parts of our country. In some of the older portions it has always been more strictly observed than in the more newly settled parts, and in New England in old times we fear it was rather a stern sort of a joy that was expressed on these days; but those were stern times, when our fathers were made to feel their many dangers and trials, and it was natural for them to adopt and embody in their institutions, a practice which had existed for centuries before in the old countries. The year past has been one for which the gas world have much cause for thankfulness. In the first place it has been spared the recurrence of any great disaster or explosion, the heart-rending details of which it has been our sad duty to record during some of the years gone by. In connection with these catastrophes it is often remarked that the best and seemingly most valuable men are the ones to suffer. Many of our readers will remember one or more occasions when, in the twinkling of an eye, from a cause perhaps yet unexplained, some one to whom they looked up for counsel and advice in their profession, was removed from their midst by such an accident. Gas men know that there is always an element of danger in their profession, and though they may by constant consciousness of it become callous to it, still it is there, and the neglect of an employee may at any instant destroy the effects of the most careful watchfulness and assiduous care; and when we look about us and reason thoughtfully upon the matter, it may almost be said that the wonder is that explosions do not oftener occur.

In this regard then the fraternity have cause for thankfulness this year. That progress is being made daily in perfecting the various processes connected with the business, may be attested by reading our columns from month to month; and if managers were a little more willing to give to each other the real facts of general interest connected with the individual sphere of each, we feel confident that the evidence of progress would be much more apparent, and the incentive thereto much greater. There is no doubt but that if any one can show how an additional thousand feet of gas can be got out of a ton of coal, giving the same light at the same or less expense, then that is what every man in the business would want to know, and there would be a thanksgiving among the stockholders at least. Yet, when we compare the results obtained now, as far as we can get at them, with those obtained years ago, there is certainly much to be placed to the credit of the intelligence, perseverance, and careful manipulation of many of those to whose care the vast interests invested in gas-making are committed.

Probably at no other time has the interest been keener and the watchfulness greater than at present, in endeavoring to improve gas-making. As proof of this, witness our patent reports. Of course all endeavors are not successful, else we should have attained perfection long since; and for this perhaps no class of men have more cause for thankfulness than gas-makers, for if every effort had come up to the predictions of many of the projectors of the various schemes set afloat through the patent office, there would be very little left to be accomplished, and most of us would have been out of business; there would no longer be a necessity for a Journal devoted to improvement in Gas-Lighting, and Illuminating Gas itself would be so cheap that it could almost be had for the asking, or perhaps the consumer would be paid something for using it.

But if some efforts have failed others have not. In some places the sharp spur of competition has forced an improvement in quality, and caused greater economy and watchfulness in securing the maximum quantity. Petroleum is no longer confined to the narrow and unclean limits of "oil lamps," but, if reports are true, it is floating in a transformed and highly elastic permanent illuminating gas through mains and services to some of the most aristocratic and elegant mansions of our largest cities, as well as in the humbler dwellings of our smaller towns. And here our thankfulness may receive a shade of sadness, that the "Naphtha Committee" were unable to throw more definite light on this very point; but the shadow passes when we reflect that at the next meeting of the American Gas-Light Association, which will occur, D. V., in our centennial year, there will be a fuller and more positive report thereon from the "Committee of the Whole." Let every one then be ready with his lamps trimmed and burning, and, when that blessed centennial year arrives, let it be recorded that ere the dawn of our second century had appeared, the gas-makers of America were ready and able to show to the world just what light could be made from a bbl. of petroleum, and what it would cost. Then shall we, at the close of another year, have renewed cause for thanksgiving that the American Gas-Light Association has been born. Trusting that our readers may in the coming year have peace and prosperity, we bespeak of them that kindly support which will enable them at its close to be thankful that we have been permitted to labor together, in behalf of the useful and honorable profession to which they belong.

M. BAZIN'S DREDGING MACHINES.

Something new in the way of a Dredging Machine is described in *Iron*, November 6th, 1875; and from the description given of it we conclude that either this, or some modification of it, must take the place of our more complicated and cumbersome machines in certain kinds of work.

This machine is the invention of M. Bazin, Marine Engineer of Augers, France. It consists of a specially equipped steam tug, capable of navigating, propelled by 60 horse-power screw engines, and fitted with several 10 inch tubes, at a depth of about 12 feet below the water line; these tubes are of a minimum length of 50 feet, movable on each side, and jointed in such a way that they may be raised or lowered by means of an iron frame work connecting their lower extremities, and so that they are self-adjusting to all the motion of the waves, or the rolling and pitching of the vessel, etc.

The principle upon which these tubes act is the natural force due to the difference in head between the water line of the vessel and that at the bottom of the vessel—on the same principle as a ship fills with water if a hole is made in her bottom. In this case the openings are continued from the bottom of the vessel to the mud surface, by means of the 10 inch tubes, and the water rushing into them (to find the level due to its

head) carries the mud, sand, etc., along with it into the hold of the vessel. Of course the delivery would soon be choked up, or the compartment filled with water, mud, etc., if nothing more was done; but here M. Bazin has a set of rotary pumps capable of raising to the deck and delivering overboard, into scows or other receptacles, the matter that is delivered into the hold of the vessel by hydrostatic pressure. By another appliance arranged under the bow, called a "disaggregator," the mud or other material to be removed is loosened up so as to more readily flow up the tubes.

The vessel being moored in place is pulled along by a hawser made fast ahead, the tubes have a lateral motion so as to cover all the ground to the width of the vessel. All the work is, of course, done by the steam power of the vessel. It is stated that the largest size are capable of removing daily 4.000 cubic yards of sand, of the density of 1·8 or 2·0, from a depth of between four and six fathoms.

M. Bazin calls these machines "Extractors"; and gives the following details of the work done by his, and that of existing class of dredging machines such as were used in the Suez Canal:

	Dredgers with long shoots.	Dredgers with Barges	Bazin's Extractors.
Cost (in francs).	650,000	330,000	180,000
Horse power....	150	150	80

Working Expenses per Cubic Meter (35 cu. ft).

	Dredgers with long shoots.	Dredgers with Barges.	Bazin's Extractors.
Fuel (in francs)	0 328	0.574	0.08
Mainten ance & repairs (in frcs.	0.323	0.479	0.04
Labor " ...	0.445	0.694	0.10
Miscellaneous "	0.100	0.100	0.10
	1.196	1.847	0.32

Work done in Cubic Metres.

	Dredgers with long shoots.	Dredgers with Ba i ges.	Bazin's Extractors.
Per hour.....	90.00	57.57	240.00
" horse power	0.60	0.40	2.75

These are certainly very good results, and worthy of attention. We know that by means of rotary pumps, vessels that have been sunk are discharged of their cargoes, consisting of grain, etc., in a very short time; but the application of the law by which a ship fills and sinks, to the useful purposes of deepening channels or slips, preparing for foundations, etc., is a novel one. This improvement differs very slightly in principle, although its details are different, from a method that has been successfully employed by General Q. A. Gilmore, U. S. A., which consisted in attaching a pipe to a pump and dropping the pipe on to the bottom, while the outlet from the pump was carried to a scow, or other receptacle, for conveying off the materials removed from the bottom. Some of the sand bars in our Southern rivers were removed in this way.

LIGHT. NO. III.

From the discussion in our last upon the law of intensity of light, it will be seen that the practical application of that law depends entirely upon our ability to obtain *perfect combustion*; and here we are met at the very first step by an array of obstacles which all the genius and study of the best minds in the business are as yet unable to fully overcome, although great progress has been made in that direction, and there is no doubt but that eventually a perfect burner will be discovered.

There are many elements that enter into the question. If, in the first place, all gas was of the same quality (or the same within reasonable limits of variation) there would be no difficulty in establishing a standard, and arranging the burner therefor. But when gas as sold to the consumers is of a quality varying from 12-candle power, as required by law in the Dominion of Canada, to 70 or 80 candle power, as is stated by Mr. Patton to be the candle power of the gas made and sold from petroleum oil, it is very easy to see that the same burner can not be made to do duty economically and successfully for all qualities of gas; and at this point it would seem that a suggestion might be made that would, if followed, be the means of establishing much more harmonious relations between the consumer and the manufacturer.—Are not too many of the gas makers contented with the mere manufacture of their gas and its delivery to the consumers' meter, while they are more or less indifferent as to the manner in which the consumer treats the article after it has passed the meter?

We do not acknowledge the justice or the policy of the rule to let them burn it (or waste it) as they please. In the first place it is an injustice to the gas itself if not properly burned; and, secondly, a great deal of useless and unnecessary dissatisfaction, ill-feeling and dispute would be saved both parties if a persistent, courteous, and well advised effort was made, on the part of the companies' officers, to instruct, explain, and assist the consumer so that they would be able to get much more real value for their expenditure than many now do. There is probably no gas engineer that does not take every known precaution in testing his own gas, to get all the advantages of proper supply, pressure, and an arrangement of burners that will give him the best possible results. The same care should be *available* at least for every consumer, and a constant effort should be made to make the consumer satisfied of the fact. If a man can be made to feel that he is getting exactly what he pays for, he is much more likely to increase than to diminish his consumption.

As it is now, too many consumers are left entirely to the instruction and guidance of the agents for "patent burners," and other devices by which the people are assured that they are going to "get ahead" of the gas companies. These agents take the most especial pains to instruct their patrons in the minutest details of the use of the article they have for sale. Many of them are valuable perhaps, but why should not the consumers receive his instructions and assistance more reliably and more satisfactorily from those who make the gas than from anyone else. There must be some cause for the trouble, and no doubt that pressure and burners will cover most cases. The application of governors to houses and, when much gas is used, to each floor of a house, would remove many of the complaints resulting from pressure much better than "check burners," which often absolutely prevent the consumer from getting his gas. There is no subject to which those who are most thoroughly acquainted with the requirements, to be satisfied in a good burner, could give their attention than in devising and securing the adoption of a burner that would give the maximum light from a given quantity and quality of gas.

Some of the English gas engineers have devoted much time and money to this subject. Is it not time that we should be able to show a little of our own ingenuity and skill in this direction. What a revolution in street-lighting would be made, if a burner were produced capable of securing *perfect combustion* of 20 feet an hour.

HON. HENRY WILSON.

On Monday of last week, the respected and honored Vice-President of the United States, died at the Capitol in Washington. After a severe indisposition he was supposed to be rapidly recovering, and, in fact, almost well, when suddenly he passed away almost without a warning. As a type of a certain kind of American, he had no superior. Of humble origin, without early advantages, he appeared upon the political stage of his adopted state as an unflinching, uncompromising champion of the ideas which he held, and to which he devoted the best energies of his life. His tower of strength was his integrity, and his success was due to his perseverance, coolness, and good judgment. He was always a peacemaker, wherever it was possible to make peace without absolute sacrifice of principle; and his name will ever stand high on the roll of honor of self-made Americans.

THE MINDELEFF REDUCTION PROCESS.

We are informed that Professor Mindeleff's process, for reducing metals from their ores by light carburetted hydrogen, has been successfully demonstrated in San Francisco. It is singular that a cheap application of those powerful reducing agents, hydrogen and gaseous carbon has not been earlier suggested.

☞ Our Report.—We would call the attention of our readers to our report of the proceedings of the American Gas-Light Association in this issue. The portion given to-day is quite interesting as it includes much of the discussion on naphtha, and also a portion of the very interesting lecture of Prof. C. F. Chandler, of the School of Mines, of Columbia College. We regret that we are unable to give our readers these proceedings more rapidly, but the crowded state of our columns prevents.—Ed.

☞ To Our Subscribers.—With our next number will close the XXIII volume of the Journal. We would most respectfully urge upon our patrons the importance of remitting promptly, and also doing whatever they may be able to extend the circulation of the paper. If any are in want of back numbers to complete their files, notice should be sent at once.

A Correction.—In Mr. Curley's letter on "lime purification," which appeared in our last issue the figures printed 4·380, should have been 7,380. The bushel of lime spoken of in the article, was a bushel of *slacked lime prepared for use.*

WANTED—A SITUATION AS FOREMAN OR SUPERINTENDENT in Gas Works, or Meter Inspector, being practical in all branches of the business, a well as Meter maker. The last few years have been Superintendent and Secretary of a city of six thousand inhabitants.
Address B. R. PERKINS,
389-2t Ind. Columous,

and nerves: and, further, that in disease this electrical force is essentially diminished.

The unavoidable conclusion from this state of things is, therefore, that electricity is not only life, but life at its best; life, vigorous and unimpaired; and that this energetic, vigorous life, can only be maintained by supplying whatever of electrical force has been displaced or exhausted by incorrect habits of life, by exposure, or exhaustion.

The one problem to be solved is this: Shall this subtle fluid, so potent for good if wisely employed, be applied through the poles of the battery, as an electrical "shock," so-called, or shall we seek the benefit desired, through the continuous current, by wearing upon the portion to be revitalized such a combination of metals as shall insure a constant though mild electrical action?

The truth is, each method has its specific place—a fact well understood by many medical men. That the simple form—the primary, induced not by the positive decomposition of metals. but rather moist contact—possesses certain advantages, we are convinced; that it is unsafe in unskillful hands is a fact established. The advantages rest in the fact that the current never ceases so long as the appliance is worn; and therefore that the result is cumulative rather than interrupted and spasmodic, and that no unpleasant sensations attend its use.—*Exchange.*

Sewer Gas at the Best End of Towns,—

In a paper read before the Cologne Engineers' Association by Mr. Hegener, attention has been drawn to the fact that in towns like Glasgow, Brussels, etc., situated in hilly districts, the best end of the town is usually on higher ground than the poorer quarters, and yet that poisoning from sewer-gas may, under certain conditions, affect the former and not the latter. The chief of these conditions will be the weight of the atmosphere. When the barometer sinks, the water seals in the closets of the high-lying end of town become ineffective, and sewage gas thus finds its way in. The only plan to insure safety is to ventilate the sewer by a pipe leading to at least the height of the roof of the house.—*Iron.*

PRICES OF FOREIGN AND DOMESTIC GAS COALS.

[Reported Expressly for this Journal.]

DECEMBER 2, 1875.

DELIVERED IN NEW YORK.

English Cannel.

Ince Hall	$17 00	@	18 00
Kirkless Hall	16 50	@	17 00

English Caking Coals.

Newcastle Gas	$5 75	@	00 00
Liverpool caking	11 50	@	12 00

British Province Coals.

Pictou			2 25
Block House—At Mines, $1.87, Gold			0 00
Caledonia—At Mines, $1.75, Gold			0 00
Little Glace Bay—At Mines, $1.75, Gold			2 00
Lingan—At Mines, $1.75, Gold			0 00
Sydney—Old Mine			3 00
" Reserve, $1.75, Gold Mine			2 25
" International			— —

Duty, 75 cents per ton, gold. Freight to New York $2 25 (urrency. Cost of above coals delivered in New York, $5 25 @ $6 00¼, currency.)

Pennsylvania Coals.

Penn Gas Coal—At Amboy	$6 10	@	0 00
Westmoreland—At Amboy	6 10	@	0 00

(In New York both the above coals $6 50)

Shafton	6 50	@	0 00
Youghiogheny	6 50	@	0 00
Waverly	6 50	@	0 00

West Virginia Coals.

Murphy Run	$6 50	@	0 00
Despard	6 50	@	0 00
West Fairmont	6 50	@	0 00
American Gas Coal	7 40	@	0 00
Fairmont	6 50	@	0 00
Newburgh Orrel	6 50	@	0 00
Pinnickinick	6 50	@	0 00
Cloverhill of Virginia	6 00	@	6 50
McKenzie Compound Mixture			— —

American Cannel Coals.

Peytona of West Virginia	$12 50	@	00 00
Darlington of Pennsylvania			— —
Cannelton Cannel			11 00
Red Bank—at Philadelphia			6 50
" —at South Amboy			7 25

Asphalts.

Albertite of New Brunswick	$— 00	@	— 00
Ritchie Mineral of West Virginia	18 00	at Balt'e.	
Trinidad Bitumen	— —	@	14 05

The Penn Gas Coal Company have contracted with the Pittsburgh Gas-Light Co. for their entire supply for the ensuing year from their Youghiogheny mines.

Gas Stocks.

Quotations by W. R. Scott & Co., Bankers,

24 PINE STREET, NEW YORK CITY.

DECEMBER 2, 1875.

☞ All communications will receive particular attention

Gas. Co.'s of N. Y. City.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Harlem	$1,850,000	50	140	145
Manhattan	4,000,000	50	212	215
Metropolitan	2,500,000	100	158	161
" Scrip		..	106	107
Mutual	5,000,000	100	107½	110
New York	4,000,000	100	150	152
Westchester	466,000	50	100	105
Gas Co.'s of Brooklyn.				
Brooklyn	2,000,000	25	250	...
Citizens	1,200,000	20	153	156
" Scrip		...	101	...
Peoples	1,000,000	10	101	103
" Bonds		...	96	98
" Scrip		...	102½	...
Metropolitan	1,000,000	100	105	106
Nassau	1,000,000	25	134	...
Williamsburgh	1,000,000	50	147	...
" Scrip		...	100	102
Out of Town Gas Companies.				
Buffalo Mutual, N. Y	750,000	100	50	50
Baltimore, Md	2,000,000	100	100	...
Brockport, N. Y	25,000	...	...	85
Citizens, Newark	500,000	...	...	55
Derby of Conn	160,000	100	...	80
East Boston, Mass.		25	112	115
Hannibal, Mo	100,000	100	58	60
Hartford, Conn	700,000	25	41	43
Hempstead, L	40,000	100	...	100
Jersey City	386,000	...	160	...
Jamaica, L. I	25,000	100	...	100
Jacksonville, Ill	120,000	50	80	90
Lewistown, Maine	400,000	100	...	75
Lima, Ohio	60,000	100	10	...
Laclede, Mo			...	123
Peoples, Jersey City		...	130	...
Peoples of Albany	1,000,000	100	...	60
Peoples of Baltimore		25	108	...
Rochester, N. Y		100	50	...
Richmond Co., S. I.	300,000	...	100	105
Fort Wayne, Ind		100	...	105
Woonsocket, R. I	150,000	100	100	...

There is a better demand for gas stocks, and prices generally higher compared with our last issue.

The following gas companies certificates were sold at auction on the 17th ulto:

$1920 Metropolitan Gas Co,'s Scrip at 105¾.

$2400 Nassau Gas Co., of Brooklyn, 101¾.

Specifications of French Patents.—The French Minister of Agriculture and Commerce, in a letter addressed to the prefects, states that Article 23 of the law of 5th July, 1844, provides that the specification of inventions patented each year, or abstracts of them, be published. Hitherto they have been issued in the form of a volume, comprising branches of industry the most varied, and often having no connection one with another, so that to obtain any desired information it was necessary to buy each volume as it appeared, and then to make a long and tedious search. In future, however, the patents will be divided into twenty groups, comprising agriculture, hydraulics. railways, textile manufactures. engines, ships and navigation, civil constructions, mining and metallurgy, domestic appliances, carriages, fire-arms and artillery, instruments of precision, fictile art, chemistry, lighting and heating, wearing apparel, industrial arts, paper making, leather and skins, Paris goods, and minor industries.

NEWARK'S WATER TROUBLE.—The citizens af Newark, N. J., experience constant trouble with their water supply. Yesterday a break was discovered in the High Service Reservoir, on South Orange avenue, and it was found necessary to let off nearly all the water. It will be some time before the leak can be examined and repuired, and in the meantime that portion of the city which is supplied from the damaged reservoir will be proportionately endangered in case of fire.—*N. Y. Herald.*

Advertisers Index.

☞ In looking for advertisements, see figures 1 to 12, within brackets, at head of advertisement pages.

GAS BURNERS, APPARATUS, ETC.

American Meter Co.—West 22nd st., N. Y., Arch and 22d st., Phil., 548 Washington st., Boston 11
Cast Iron Gas and Water Pipe—S. Decatur Smith, York and Moyer streets, Phila., Pa 8
Cast Iron Gas and Water Pipes—R. D. Wood & Co., Philadelphia Pa 10
Cast Iron Gas and Water Pipe—Jno. McNeal & Sons, Burlington, N. J. 8
Franklin Foundry and Pipe Works—Jas. Marshall & Co., 23 Nineteenth street, Pittsburgh, Pa 2
Gas Valves (Chapman) 75 and 77 Kilby st., Boston, Mass 3
Gas-Burners—C. Gefrorer, 248 North 9th st., Phila., Pa 9
Gas Purification—St. John and Cartwright 5
Gas Meters, etc.—Harris, Griffin & Co., 12th and Brown streets, Phila., Pa 10
Gas Meters, etc.—Wm. W. Goodwin & Company, 1012 Filbert street, Phila, Pa 11
Gas Meter Manufacturers—Harris & Bro., 1117 Cherry st., Philadelphia, Pa 11
Gas Fixtures, Etc.—Mitchell, Vance & Co., 597 Broadway .. 7
Gasholders, Etc.—Defly & Fowler, 39 Laurel st., Phila., Pa .. 4
Gas Screen—James P. Mahon, Boston, Mass 5
Lime Hurdles.—Manhattan Lime Hurdle Co., Geo. W. Day, Treas., No. 3 Railroad Square, Haverhill, Mass 2
Lava Tips and Scotch Tips—Charles H. Meyer & Co., 227 Chestnut street, Phil. Pa 8
National Tube Works Co., 78 William St., N. Y 7
Patent Conically Slotted Wood Trays—John L. Cheesman, 147 and 149 Avenue C., N. Y 4
Patent Gas Exhauster—Smith & Sayre, 95 Liberty street .. 4
Pelouze & Audouin Condenser—Jas. R. Smedberg, Sole Agent for U. S. San Francisco, Cal.; Henry Cartwright, 2107 Green street, Phil. Pa 1
Petroleum Gas—J. D. Patton, Trevertou, Pa 4
Patent Gas Exhauster—S. S. Townsend, Agt., 31 Liberty street, N. Y 3

GAS COALS

Cannelton Coal Co. of West Virginia—J. Tatnall Lea, 336 Chestnut street, Phila, Pa 3
Despard Coal Co.—Parmelee & Bros., Agents, 32 Pine st., New York 7
Gas Coals—Perkins & Job, 27 South st., N. Y 7
New York and Cleveland Gas Coal Company—384 Penn Avenue, Pittsburgh, Pa 6
Penn Gas Coal Co.—11 Merchants' Exchange, Phil. and 90 Wall street, N. Y 6
Peytona Cannel Coal—S. E. Low, 58 Broadway, N. Y 5
The Newburg Orrel Coal Co.—Chas. W. Hays, Agent in New York, Trinity Building, 111 B'way, Room 7 6
Tyrconnell Gas Coal—52 S. Gay Street, Baltimore, Md 6
Westmoreland Coal Co.—230 South 3rd Street, Phil. Pa 6
Youghegheny Coal—Perkins & Job, 27 South St N. Y 7

FOUNDRIES.

Atlantic Dock Iron Works—John P. Kennedy, Office 98 Liberty street, N. Y., P. O. Box 2348 11
Cast-Iron Pipes and Fittings—B. S. Benson, 52 East Monument street, Baltimore, Md 6
Continental Works—T. F. Rowland, Greenpoint 6
Camden Iron Works, Camden, N. J.—Jesse W. Starr & Son.
Gloucester Iron Works—J. P. Michellon, Sec., 6 North 7th street, Phila., Pa 4
Mill Street Foundry.—Geo. Stacey & Co., Cincinnati. O 5
National Foundry and Pipe Works—Wm. Smith, Carroll, Pike, Smallman & Wilkins streets, Pittsburg, Pa 6
Oregon Iron Foundry—Herring & Floyd, 740 Greenwich street, N. Y 10
Pascal Iron Works—Morris, Taskar & Co., Philadelphia 12
Providence Steam and Gas Pipe Co., Providence, R. I.—H. A. Branch, Agent 3

WATER METERS, PUMPS, ETC.

Cast Iron Pipes for Water and Gas—Riley A. Brick, 112 Leonard street, N. Y 10
Valves for Water, Steam and Gas—Ludlow Valve Man'g Co., 940 River street, Troy, N. Y 16

CLAY RETORT WORKS.

B. Kreischer & Son, Clay Retorts, etc., 58 Goerck st., N. Y. 8
Cheltenham Fire Brick and Clay Retort Works—Evens & Howard, 916 Market street, St. Louis, Mo 8
Manhattan Clay Retort Works, 15th st., near Av. C, N. Y .. 8
Philadelphia Fire Brick Works, Vine and 23d sts., Phila 8

LAMPS, STOVES, PETROLEUM, ETC.

Lamps—M. B. Dyott, 114 South 2nd Street, Phil. Pa 1
Patent Lamp Post—J. W. Graham, Chillicothe, Ohio, or A. M. Callender, office of this Journal 9

MISCELLANEOUS.

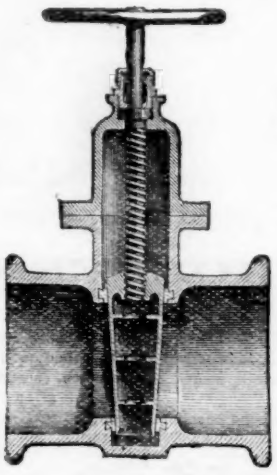
Analysis and Testing of Gas Coals—Prof. Henry Wurtz, 12 Hudson Torrace, Hoboken, N. J. 10
Architect and General Gas Engineer—William Farmer, 111 Broadway Room 95, N. Y 7
Brass Cocks, Plumbers' Materials, etc., etc.—McNab & Harlin Manufacturing Co., 56 John st., N. Y 7
Cements—S. L. Merchant & Company, 76 South st., N. Y ..
Contractors for Gas Works, Etc.—Murray & Baker, Fort Wayne, Ind 2
Fodell's System of Bookeeping—A. M. Callender & Co., 42 Pine st., New York 1
Gas Engineer—B. E. Cholar, 914 Olive St., St. Louis, Mo ...
Gas-Light Company of America, 63 and 64 Drexel Building, New York 2
Kidd's Gas Consumers Guide—A. M. Callender & Co., 42 Pine Street, N. Y 2
Massachusetts Institute of Technology—Samuel Kneeland Boston, Mass 9
National Coal Gas Company—H. P. Allen, 4 Warren street New York 6
School of Mines, Columbia College, East 49th st 9
Screening Shovels—Herring & Floyd, 740 Greenwich st., New York 7
Scientific and Practical Chemist and Geologist—Profetsor Henry Wurtz, 12 Hudson Terrace, N. J 10
Screening Shovels—G. W. Dean, 1358 Broadway, N. Y ... 10

CHAPMAN VALVE MANUFACTURING CO.

MANUFACTURERS OF

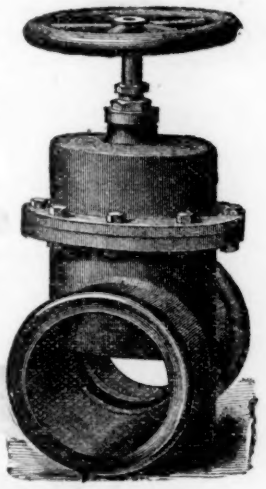
CHAPMAN GAS VALVES.

Office and Sales Room 75 and 77 Kilby Street, Boston.



These Valves have been in use for several years, and are pronounced by all who have used them to be

The Best Gas Valves Ever Made.



They afford a direct passage the full size of the pipe. The seats are made of an alloy similar to BABBITT metal, specially prepared for the purpose, and superior to all other metals used for the seats of Gas Valves. It does not corrode under any circumstances to which it is exposed.

There is no LIABILITY OF COHESION between the Gate and Seat, and the Valves can be relied upon to SHUT TIGHT and OPEN EASILY at all times—an important desideratum when used for street mains, in cases of fire.

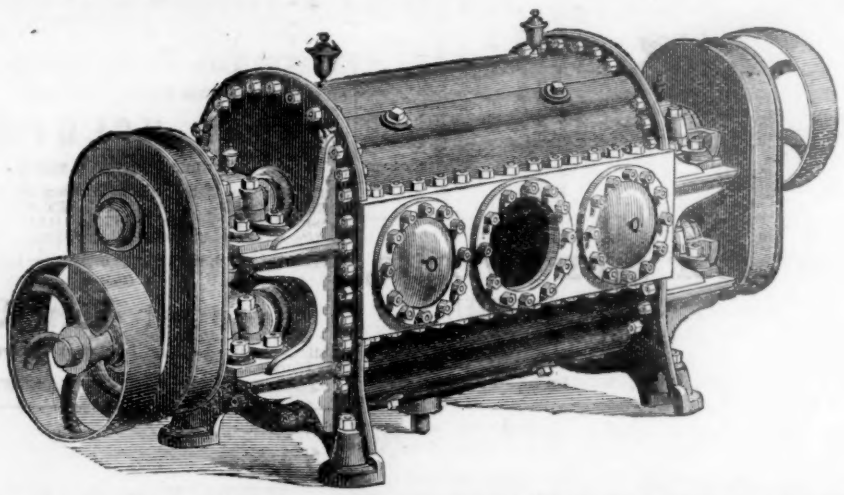
We refer to the following named Gas-Light Companies among the many that have used these Valves:

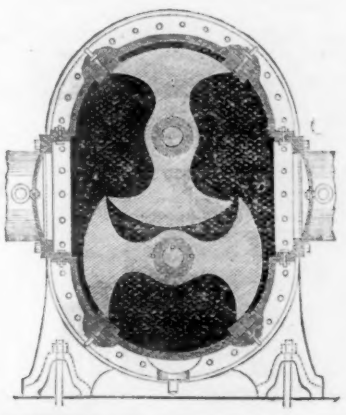
BOSTON GAS-LIGHT COMPANY, BOSTON, MASS.
CAMBRIDGE GAS-LIGHT COMPANY, CAMBRIDGE, MASS.
NEWTON & WATERTOWN GAS-LIGHT CO., WATERTOWN, MASS.
LAWRENCE GAS-LIGHT COMPANY, LAWRENCE, MASS.
PEOPLES GAS-LIGHT COMPANY, BROOKLYN, N. Y.
CITIZENS GAS-LIGHT COMPANY, BROOKLYN, N. Y.
SOUTH BOSTON GAS-LIGHT COMPANY, BOSTON, MASS.
CHARLESTOWN GAS-LIGHT CO., CHARLESTOWN, MASS.
LYNN GAS-LIGHT COMPANY, LYNN, MASS.
FITCHBURG GAS-LIGHT COMPANY, FITCHBURG, MASS.
CITIZENS GAS-LIGHT COMPANY, NEWARK, N. J.
WILLIAMSBURGH GAS-LIGHT CO., WIRLIAMSBURGH, N. Y.

GAS AND WATER VALVES ½ INCH TO 36 INCHES DIAMETER.
STEAM VALVES ½ INCH TO 12 INCHES DIAMETER.

357-tf

PATENT IMPROVED GAS EXHAUSTER.





P. H. & F. M. ROOTS, PATENTEES AND MANUFACTURERS, CONNERSVILLE, IND.
S. S. TOWNSEND, GENERAL AGENT, 31 LIBERTY STREET, NEW YORK.

The following are some of the advantages we claim for this Exhauster over all others:

FIRST.—It is simpler in its mechanical construction than any other Exhauster in use.

SECOND.—The internal parts consist of only two revolvers, each cast entire in one piece, without a single screw, bolt, nut, washer, key or other part to get loose on the inside and stop or break the machine. The internal operating parts, therefore, can not get out order, and hence require no care or attention.

THIRD.—Every part of the machine requiring care or attention, as the journals, gearing, etc., is external, easily observed and attended to. All changes, adjustments, and repairs are made from the outside. The journal bearings, if necessary, can be renewed in a few minutes.

FOURTH.—The internal operating parts are practically gas-tight, but are not in actual contact, hence there is no internal friction or wear. The machine is therefore operated with less power than any other.

FIFTH.—They are built in the most complete and substantial manner, with steel shafts and improved journal bearings, and their durability is almost without limit.

We build them of any required capacity, large or small, adapted to any kind of works or place.

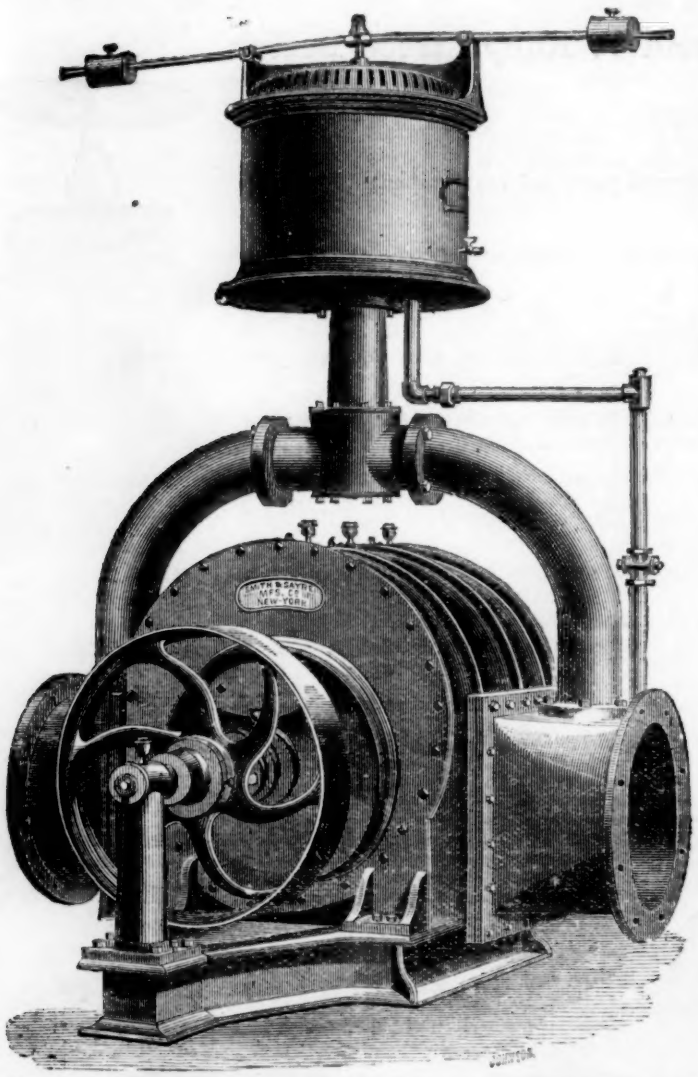
Send for Illustrated Catalogue, giving all particulars as to capacity, speed, power required, dimensions, and price of each size, and references to parties using them.

P. H. & F. M. ROOTS.

SMITH & SAYRE MANUFACTURING COMPANY.

The Mackenzie Patent Gas Exhauster

And Patent Compensator.



They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-Jo ints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

We are also sole proprietors and manufacturers of the

MACKENZIE PATENT BLOWER, PATENT CUPOLA AND SMELTING FURNACE.

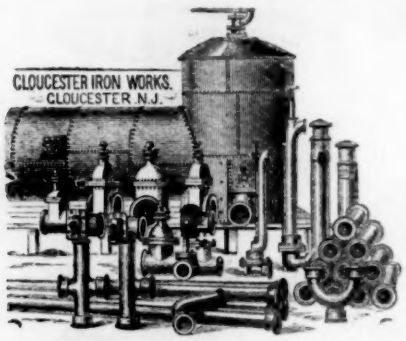
The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary fan' The Cupolas are manufactured in sizes to melt from 1 to 30 tons per hour, will save one quarter of the time required by the old style Cupola and 33 per cent fuel. Address

G. G. PORTER, President.

JAMES M. SAYRE, Treasurer.

CHARLES W. ISBELL, Secretary.

OFFICE, 95 LIBERTY STREET, New York.



Gloucester Iron Works,

OFFICE—NO. 5 NORTH SEVENTH STREET,

PHILADELPHIA.

DAVID S. BROWN, Pres't. JAMES P. MICHELLON. Sec'y.
BENJAMIN CHEW, Treas. WILLIAM SEXTON, Sup't.

CAST IRON GAS AND WATER PIPE.

Cast Iron Heating and Steam Pipe. Stop Valves, water or Gas.

Fire Hydrants,

GAS HOLDERS.

EVENS & HOWARD,

Manufacturers of a superior quality of

Fire-Brick, Clay Gas Retorts,

Gas Tile, Drain Pipe, Fine Ground Fire Clay, &c.

916 Market Street, St. Louis, Mo.

TYRCONNELL GAS COAL.,

MINED IN TAYLOR COUNTY, WEST VA.

Company's Office, 52 S. Gay St., Baltimore.

CHARLES MACKALL, Secretary.

CHARLES W. HAYS, Agent, Room 7, 111 B'way, N. Y.

SHIPPING POINT—Baltimore, Md.

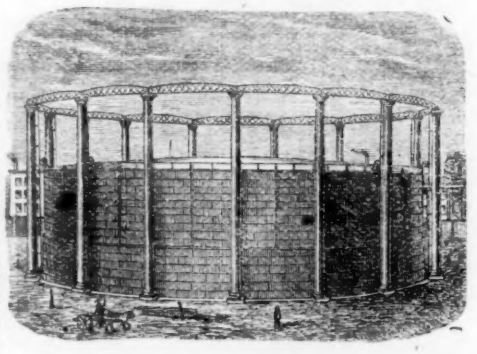
This coal yields 10,000 cubic feet of Gas, with an illuminating power of over 16 candles. Forty bushels very superio Coke, with little Ash, and scarcely any clinker. 04-1y

T. F. ROWLAND,

Continental Works,

GREENPOINT, BROOKLYN, N. Y.

ENGINEER, AND MANUFACTURERS OF



GAS-HOLDERS

OF ANY MAGNITUDE,

Condensers, Scrubbers, Purifiers, Retorts, Hydraulic Mains and all other articles connected with the Manufacture and Distribution of Gas, furnished with despatch. Plans and Specifications prepared, and Proposals given for the necessary Plans for Lighting Cities, Towns, Mansions, and Manufactories.

JESSE W STARR & SON,

Camden Iron Works

Camden, New Jersey,

Office in Philadelphia No. 435 Chestnut St., where a member of the Firm can be seen between 12 m. and 2 p. m. daily.

MANUFACTURERS OF

ALL KINDS OF CASTINGS AND APPARATUS FOR GAS WORKS,

Wrought Iron Roof Frames,

For Retort and other houses Retorts and all castings required for setting them in the latest and most improved model. WASHERS, CONDENSERS, SCRUBBERS and EXHAUSTERS for relieving the Retorts from pressure. PURIFIERS, varying from 2,000 to 2,000,000 cubic feet daily purifying capacity.

Wrought Iron Lime Sieves

for Purifiers. Station Meters of all sizes.

GAS HOLDERS,

TELESCOPIC AND SINGLE,

With cast iron guide and suspension frames. GAS GOVERNORS or REGULATORS, STREET MAINS, from 1¼ to 48 INCHES DIAMETER, for WATER or GAS. Street Main connections, such as BRANCHES, BENDS, DRIPS, SLEEVES, etc.

STOP VALVES, from 3 to 30 inches, for both Water and Gas.

Wrought Iron Work.

All the Smith and Sheet Iron work required in and about Gas Works. 226-tf

JESSE W. STARR. JESSE W. STARR, JR.

P.P. DEILY, *1842.* J. FOWLER. *1875.*

DEILY & FOWLER,

39 LAUREL STREET, PHILADELPHIA, PA.,

Builders of Gas Works.

MANUFACTURERS OF

GAS-HOLDERS,

Single and Telescopic.

WROUGHT IRON ROOF FRAMES, COAL WAGONS, COKE BARROWS,

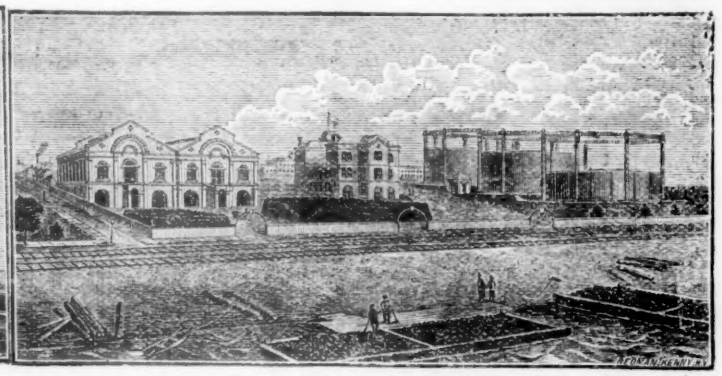
AND ALL

Wrought Iron Work

CONNECTED WITH GAS WORKS.

☞ Particula attention paid to Extensions and Repairs

CINCINNATI GAS WORKS, ERECTED 1871-72-73.—WM FARMER, ENG.



LACLEDE GAS WORKS, ERECTED 1872.—WM. FARMER, ENG

WILLIAM FARMER.

ARCHITECT AND GENERAL GAS ENGINEER,

111 BROADWAY, TRINITY BUILDING, Room 95, New York.

WILLIAM FARMER may be consulted upon all matters connected with the construction of GAS WORKS, or any other description of buildings. Will furnish General and Detail Drawings, Specifications and Estimates for Gas Works of any capacity.

PATENTEE OF THE FOLLOWING INVENTIONS:

Exhausters for Gas and Foul Lime Ventilation,
Dumping Barrows for Coal, Coke and Lime,
Hydraulic Mains for Retort Benches,
Blowers for Forges, Foundries, &c.
Pumps for Water, &c., &c.

REFERENCES:

Professor SILLIMAN, New Haven, Conn.
GEN. CHAS. ROOME, President Manhattan Gas-Light Company, N. Y.
A. W. BENSON, President Brooklyn Gas-Light Company, Brooklyn, N. Y.
W. W. SCARBOROUGH, President Cincinnati Gas-Light Company, Cincinnati, Ohio.
S. L. HUSTED, President Laclede Gas-Light Company, St. Louis, Mo.
Prof. HENRY WURTZ, 12 Hudson Terrace, Hoboken, New Jersey.
GEN. A. HICKENLOOPER, Vice-President Cincinnati Gas-Light Co., Cincinnati, Ohio
FREDERICK CROMWELL, Vice-President Laclede Gas-Light Company. St. Louis Mo.
C. VANDERVOORT SMITH, Engineer Manhattan Gas-Light Company, N. Y.
JAMES R. SMEDBERG, Consulting Engineer, San Francisco Gas-Light Co., Cal.

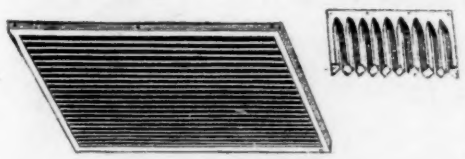
To Gas Companies.

CHEESMAN'S

CONICALLY AND DIAMOND SLOTTED

SOLID WOOD TRAYS.

PATENTED OCTOBER 21, 1862 AND JUNE 10, 1873.



The above Trays are made from half inch to one and a quarter inch thick with a strong centre piece, bars bevelled on top. Also the Diamond Bar Tray can be used either side up; smoothest and most durable Trays in use. They are now used by more than three hundred Gas Companie in the United States and other places.

JOHN L. CHEESMAN,
151 and 153 Avenue C, New York.

GEO. W. DRESSER,

CIVIL ENGINEER.

TRINITY BUILDING,

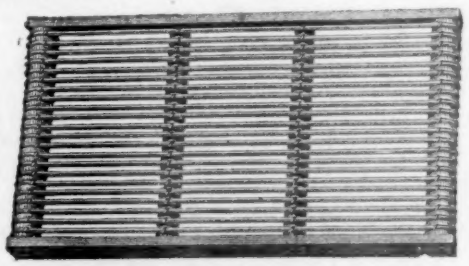
ROOM 93. 111 BROADWAY.

THE MANHATTAN

LIME HURDLES

after a practical trial have been adopted by over thirty Gas-Light Companies *the last season*, some of them the largest in the country.

They are LIGHT, STRONG and DURABLE, made *with Ash frame* and *round flexible Rattans.*



Shipped to all parts of the country.
Address

THE MANHATTAN

LIME HURDLE CO.

HAVERHILL, MASS.

J. L. BLAISDELL, President.
GEORGE W. DAY, Treasurer. 389

THE NATIONAL OIL JOURNAL

CONTAINS

INFORMATION CONCERNING THE PRODUCTION MANUFACTURE AND USE OF ALL KINDS OF OIL.

EVERY ONE INTERESTED IN OIL SHOULD TAKE IT

Subscription—One Dollar.

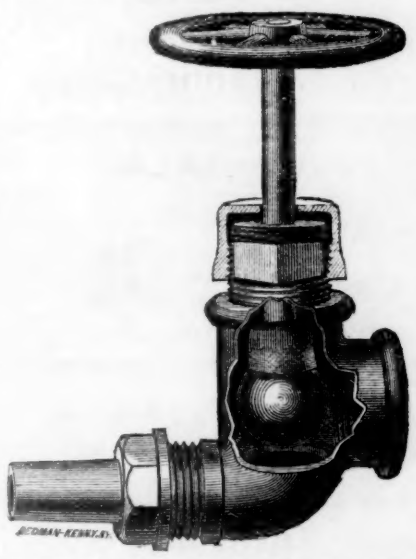
Sample Copies Ten Cents.

NATIONAL OIL JOURNAL COMPANY,
PITTSBURGH, PA

SOMETHING NEW.

THE HUMPHREYS VALVE.

FOR USE AT CONSUMER'S METERS.



This valve is made of malleable iron, and is specially adapted to encounter the heat of burning buildings, in which the ordinary meter cock (made of brass) will crumble or melt. It is opened or shut with ease, by sliding the stem up or down, the latter being held where desired by the friction of the packing. It is perfectly tight, and is not so liable to get out of order as the meter cock: its cost being about the same.

Send for price list to WILLIAM HUMPHREYS, Waterford, N. Y.

GAS COALS.

THE
PENN GAS COAL COMPANY

OFFER THEIR

COAL, CAREFULLY SCREENED,

AND PREPARED FOR

GAS PURPOSES.

Their Property is located in the Youghiogheny Coal Basin, near Irwin's and Penn Station, on the Pennsylvania Railroad, and on the Youghiogheny River.

OFFICES

No. 11 Merchants Exchange, Phil'a. 90 Wall Street, New York.

PLACES OF SHIPMENT.

Pennsylvania Railroad, Pier No. 2 (Lower Side).
Greenwich Wharves, Delaware River.
366-1y **Pier No. 1 (Lower Side), South Amboy, N. J.**

CANNELTON COAL CO.

OF WEST VIRGINIA.

Offer for sale the following Coals, from their Colliery at CANNELTON, Kanawha County, West Virginia, delivered at RICHMOND, Va.:

CANNELTON CANNEL,

cknowledged to be the most valuable ENRICHER produced in this country, a gross ton yielding 10,000 ubic feet of GAS of 64·54 CANDLE POWER; COKE 32 bushels, of good quality.

CANNELTON CAKING COAL.

Volatile Matter.	Coke.	Per cent. of Ash in		Sulphur in			Specif. Gravity.	
		Coal.	Coke.	Coke.	Oötl.	Volatile Matter.	Coal.	Gas.
35.1	64.9	2	6	.82	1.48	.66	1,289	.476

MAXIMUM YIELD, 5.06 cubic feet of Gas per pound of Coal—A yield of 4·78 cubic feet per lb.. —gave 16 14-100 Candle-Power.

COKE, of very fine quality—1453 pounds produced from one ton of coal.

SALES AGENTS { J. TATNALL LEA, Treasurer, P. O. Box 1747 Philadelphia. / PERKINS & JOB, 27 South Street, N. Y.; 91 State Street, Boston. / H. W. BENEDICT & SON, New Haven.

JAMES McKELVIE,

CANNEL COAL MERCHANT,

HAYMARKET, EDINBURGH.

ESTABLISHED 1840.

AGENT FOR

THE BOGHEAD

CANNEL COAL.

THE DUKE OF HAMILTON'S

Lesmahaga Cannel Coal

THE WOODBANK AND PIRNIE

CANNEL COALS.

THE DUKE OF HAMILTON'S

Home Farm and Bo CANNEL COALS.

THE AUCHLOCHAN & QUARTER

CANNEL COALS.

Analyses and Prices of all the principal SCOTCH CANNEL COALS will be forwarded on application. 360-1y

THE NEWBURGH

Orrel Coal Company,

Mines at Newburg, Preston County, W. Va.

Company's Office, No. 52 S. Gay Street, Baltimore, Md.

C. OLIVER O'DONNELL, Pres't. CHAS. MACKALL, Sec'y.

CHAS. W. HAYS, Agent in New York, Room 7, Trinity Building, 111 Broadway.

SINCLAIR & AGNEW, Agents, Alexandria, Va.

This Company offer their very superior Gas Coal at lowest market prices.

It yields 10,996 cubic feet of gas to the ton of 2,240 lbs. of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.

It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York; the Brooklyn and Citizen's Gas Light Companies of Brooklyn, N. Y.; the Baltimore Gas Light Company of Baltimore, Md., and the Providence Gas Light Company, Providence, R. I.

The best dry coals shipped, and the promptest attention given to orders. 224-1y

THE DESPARD COAL COMPANY

OFFER THEIR SUPERIOR

DESPARD COAL

To Gas Light Companies throughout the country.

Agents, PARMELEE BROTHERS, No. 32 Pine street, N. Y.

BANGS & HORTON, No. 31 Duane street, Boston.

Mines in Harrison County, West Virginia.

Wharves Locust Point, Company's Office, 29 South street, } Baltimore.

Among the consumers of Despard Coal, we name: Manhattan Gas Light Company, New York; Metropolitan Gas Light Company, New York; Jersey City Gas Light Company, N. J.; Washington Gas Light Company; Portland Gas Light Company, Maine.

*** Reference to them is requested. 204-1y

NEW YORK AND CLEVELAND

GAS COAL COM'Y

Of Pittsburgh, Pa.

MINERS AND SHIPPERS OF

YOUGHIOGHENY GAS COAL.

This Company is prepared to furnish any amount of their justly celebrated, and acknowledged superior GAS COAL, to any point reached by railroad or navigation, on most favorable terms.

General Office—384 Penn Avenue, PITTSBURGH, PA.

Branch Office—C. & P. RR. Coal Pier, CLEVELAND, OHIO.

WILLIAM A. McINTOSH, President.
A. CARNEGIE, Vice-President.
W. P. DE ARMIT, Treasurer.
THOMAS AXWORTHY, Agent at Cleveland, Ohio.
W. H. WATERBURY & CO., General Sales Agents,
351-1y 137 Broadway, New York.

PEYTONA

CANNEL COAL

From West Virginia.

Yields over 13,000 feet of Gas per ton. At ten thousand feet (standard yield) the illuminating power is over 43 candles. Purifies 4,510 feet to the bushel of lime.

S. E. LOW, Secretary,
Office, 58 Broadway.

OFFICE OF THE

NATIONAL COAL GAS COMPANY,

No. 4 Warren Street, New York.

H. P. ALLEN, President.
I. B. BRICE, Vice-President.
A. H. ALLEN, Secretary.
WM. J. VALENTINE, Treasurer.
GEORGE W. HARRIS. Engineer.

This Company is the owner of the GWYNNE-HARRIS, o AMERICAN HYDROCARBON process, for making Gas for Lighttng or Heating purposes, by the perfect decomposition of superheated steam, under what is known as the

GWYNNE AND HARRIS PATENTS.

This process has been fully tested nearly 50,000,000 cubic feet of Gas having been made under it, and fully demonstrating the fact that it is the greatest improvement ever made in the manufacture of Gas, either for Lighting or Heating purposes. With half a ton of Anthracite Coal 150,000 cubic feet of Gas per day is made from three benches, and the labor is so small that one man can attend three or four benches.

The process can be put into either Coal or Oil Gas Works (or where both Coal and Oil are used) at small cost, without any interruption to the working of other benches. The Citizens Gas-Light Company of Brooklyn, after using it for more than seven months, have found it not only far better, but actually *cheaper* than atmospheric air in making Gas, with the use of "petroleum and its products."

Further information, and terms of sale of rights will be ven, upon application to the Company 348-1y

Portland Cement,

Roman Cement,

Keene's White Cement,

NUMBERS 1 AND 2.

From best London Manufacturers.

FOR SALE BY

S. L. MERCHANT & CO.,

76 South Street, New York,
Corner Maiden Lane. 344-1y

B. E. CHOLLAR,

GAS ENGINEER,

914 OLIVE STREET, ST. LOUIS, MO.

355-

WROUGHT IRON

ENAMELED GAS AND WATER PIPE,

MANUFACTURED SOLELY BY THE

NATIONAL TUBE WORKS COMPANY.

ALSO MANUFACTURERS OF

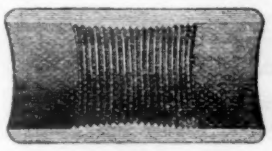
Lap-welded Steam and Gas Pipe,
Tubing and Casing for Artesian, Oil and Salt Wells (WITH PATENT PROTECTING COUPLING),
Lap-welded Iron Boiler Tubes,
Mack's Patent Injector, Etc.

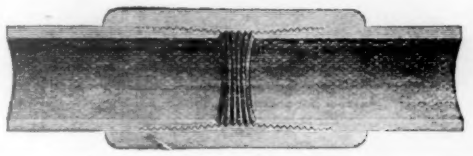
WORKS AT BOSTON, MASS., AND McKEESPORT, PENN.

OFFICES AND WAREHOUSES.

New York, No. 78 William Street.
Buffalo, No. 216 Main Stree
Chicago, Nos. 112, 114 & 116 Lake Street,
Cincinnati, Nos. 119, 121 & 123 Pearl St.

Patent Sleeve or Protecting Couplings





THE WAVERLY COAL AND COKE CO.

Offer for Sale the

YOUGHIOGHENY COAL

DOUBLE SCREENED,

from their Colliery at Smith's Mills, on the Youghiogheny River, thirty-seven and a half miles southerly of Pittsburgh. This Coal has the preference in Pittsburgh over all other YOUGHIOGHENY COAL for GAS PURPOSES.

The facilities of the WAVERLY COMPANY are unsurpassed by those of any other Company on the Youghiogheny.

Full particulars can be had by addressing

PERKINS & JOB, Agents,
27 South Street, New York.
91 State Street, Boston.

THE WESTMORELAND COAL CO.

CHARTERED 1854.

MINES situated on the **Pennsylvania** and the **Connellsville Railroads** in **Westmoreland County, Pa.**

POINTS OF SHIPMENTS:

PENNSYLVANIA RAILROAD, Pier No. 2 (upper side), Greenwich, Delaware River,
Pier No. 1 (upper side), South Amboy, New Jersey.

Since the commencement of operations by this Company its well known

BITUMINOUS COAL

has been largely used by the **GAS COMPANIES, RAILROADS,** and **IRON and STEEL WORKS** in the **New England** and **Middle States,** and its character is established as having no superior for freedom from sulphur and other impurities.

Principal Office, **No. 230 South Third Street, Philadelphia.**

EDWARD C. BIDDLE, President.
EDMUND H. McCULLOUGH, Sec. FRANCIS H. JACKSON, Vice Pres't

FOR SALE,

200 Tons
CANNEL CHIPS.

Address H. E. HOY,
34 New Street, N. Y.

Gas Engineers,

AND PARTIES ENGAGED IN THE BUILDING OF

GAS WORKS,

who desire information regarding PETROLEUM GAS, either or use pure, or for enriching, are requested to address, stating particulars.

J. D. PATTON,
363-uni Treverton, Northumberland Co. Pa.

J. H. GAUTIER & CO.,

CORNER OF

GREENE AND ESSEX STREETS,

JERSEY CITY, N. J.

MANUFACTURERS OF

Clay Gas Retorts,
Gas House Tiles,
Fire Bricks, Etc. Etc.
Ground Clay, Fire Brick and Fire Sand in Barrels,

ALWAYS ON HAND.

J. H. GAUTIER.
893-1y C. E. GREGORY.

MITCHELL, VANCE & CO.,
Manufacturers of

CHANDELIERS!

And Every Description of

GAS FIXTURES,

Also Manufacturers of

Fine Gilt Bronze and Marble Clocks, warranted best Timekeepers, Mantle Ornaments, &c.

Salesroom, 597 BROADWAY,

Rear Entrance 140 Mercer Street,) NEW YORK.

Special designs furnished for Gas Fixtures for Churches ublic Halls Lodges, &c.

RILEY A. BRICK & CO.,

MANUFACTURERS OF

CAST IRON PIPES,

FOR WATER AND GAS,

ALSO,

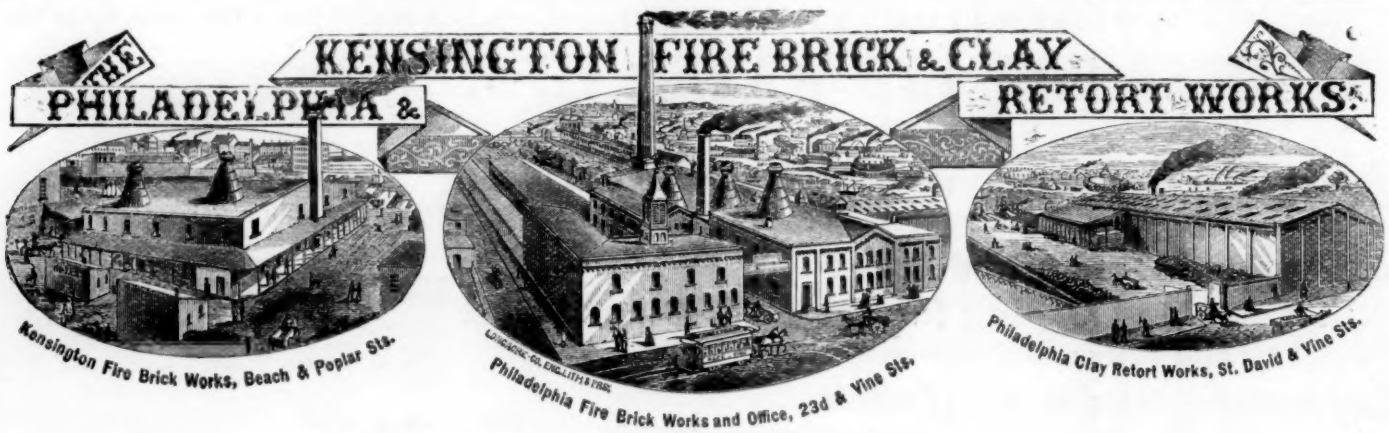
AS WORKS AND MACHINERY CASTINGS

OF EVERY DESCRIPTION,

No 112 Leonard Street, New York.

RILEY A. BRICK. W. W. CAMPBELL.

SPRINGFIELD GAS MACHINE
238 CANAL ST.
NEW YORK

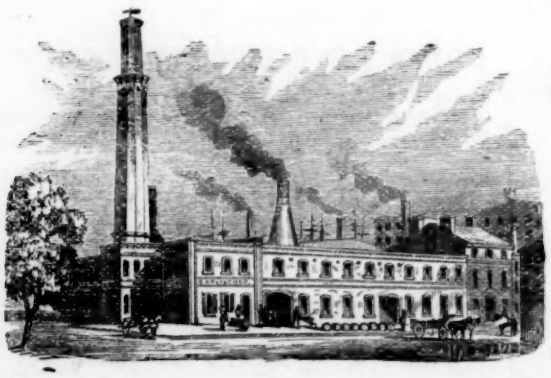

THE PHILADELPHIA &
KENSINGTON FIRE BRICK & CLAY
RETORT WORKS.
Kensington Fire Brick Works, Beach & Poplar Sts.
Philadelphia Fire Brick Works and Office, 23d & Vine Sts.
Philadelphia Clay Retort Works, St. David & Vine Sts.

PHILIP NEUKUMET,

(SUCCESSOR TO JOHN NEUKUMET),

Manufacturer of Fire Bricks, Tiles, Gas and Sugar House Retorts.

☞ Plans of Settings for Benches of Threes, Fives, and Sixes furnished, free of charge, upon application.



NEW YORK
FIRE BRICK AND CLA
Retort Works.

☞ *Established in* 1845. ☜
(Branch works at Kreischerville, Staten Island.
B. KREISCHER & SON,
OFFICE,
8 Goerck Street, cor. Delancy, N. Y
GAS RETORTS, TILES & FIRE BRICK
Of all shapes and sizes.
FIRE MORTAR, CLAY AND SAND.
Articles of every description made to order at the shortest notice.
B. KREISCHER & SON

JOHN McNEAL & SONS,

MANUFACTURERS OF

Cast Iron Gas and Water Pipe.

Works—Burlington, N. J.

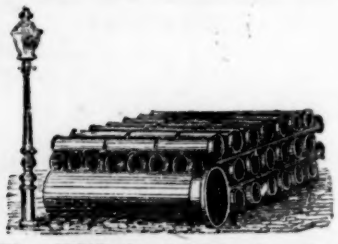
Having withdrawn from the firm of R. D. Wood & Co., the practical management of which we have had since the organization of that firm until June 1871, we have now completed our Works for the manufacture of CAST IRON PIPE and Castings generally.

Having immediate rail and water communication with New York and Philadelphia, as well as the coal and iron regions we have every advantage of situation.

Our experience in the manufacture of Pipe for a great many years, has enabled us in rebuilding to practically apply Machinery and Fixtures of the very best character, to insure *good work.*

We are now prepared to contract for this class of Castings under the most favorable terms.

Office and Works Burlington, N. J.



R. D. WOOD & CO.,

PHILADELPHIA.
MANUFACTURERS OF

CAST IRON PIPE

FOR GAS AND WATER
Lamp Posts, Valves, Etc.
Mathew's Pat. Anti-Freezing Hydrants,
400 Chestnut Street.

JAMES MARSHALL & CO.

Franklin Foundry and Pipe Works,

MANUFACTURERS OF

GAS, WATER, AND OIL PIPES,

Works, 18th, 19th, 20th and Railroad Street.
Office, No. 23 Nineteenth Street.
Pittsburgh, Pa.

B.—Pipe from 3-inch and upwards cast in 12 ft. lengths.
☞ Send for Circular and Price List.

S. DECATUR SMITH,

CAST IRON GAS and WATER PIPE,

Foundry, Cor. of York and Moyer Streets,
PHILADELPHIA.

Several Thousand 2, 3, 4, 6 and 8 Inch Cast Iron *Gas and Water Pipes* on hand, for immediate delivery.

☞ FITTINGS FOR GAS AND WATER MAINS. ☜

MANHATTAN
FIRE BRICK & ENAMELLED CLAY

RETORT WORKS.

ADAM WEBER,
(Successor to Maurer & Weber.)
PROPRIETOR.
Office and Works, 15th Street, Avenue C.
Manufactures of
FIRE BRICK AND TILES,
Of all shapes and sizes.
FIRE MORTAR, CLAY AND SAND.
☞ Articles of every description made to order at short notice. (135

CHAS. H. MEYER & CO.,
227 Chestnut Street, Philadelphia, Pa.,
IMPORTERS OF

LAVA TIPS AND SCOTCH TIPS.

ALL ORDERS DELIVERED FREE TO NEW YORK.
359-1y

T. Dean, Pres't. } {H. N. Smith, Treas.
S. F. Dewey, V. Pres. } OFFICE OF {Chas. F. Dean, Sec.

THE GAS-LIGHT CO. OF AMERICA

Nos. 63 and 64 Drexel Building,

P. O. Box, 5131. NEW YORK.

THE GAS-LIGHT COMPANY OF AMERICA, owners of the Patent Processes for making ILLUMINATING GAS from PETROLEUM and its products, known as the

Gale and Rand
AND
Wren and Barker Patents,

are prepared to treat with Gas Companies and Manufacturers of Gas for the use of said processes.

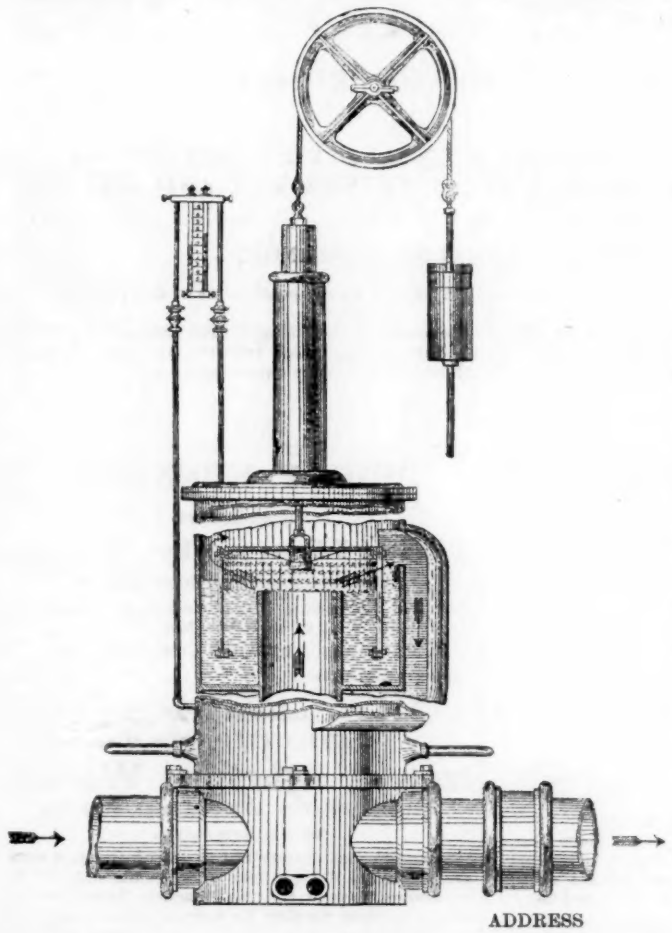
An examination of the merits of these inventions as demonstrated by practical experience in a large number of Gas Works employing them, will not fail to convince the intelligent Gas Manufacturer of the great advantages derived from their use.

Gas of unexceptional quality, of high illuminating power is made at many of these works by these processes, at a cost of from 40 per cent. to 60 per cent. less than an ordinary qualito of illuminating gas can be made by any other methods in use. Gas Companies generally may easily, and at small outlay for making the necessary changes in manufacturing apparatus, double their net earnings, and supply a much better light their patrons, at greatly reduced prices.

The Company respectfully refer to Companies using these processes in this city, Reading, Penn., Chicago and elsewhere, and especially to the Mutual Gas-Light Company of Detroit, Mich., whose works more nearly conform in all details of construction to the original plans of the inventors, than those of other Companies.

For Correspondence, etc., address to office as above.

CHARLES F. DEAN, Secretary



ADDRESS

OR

Sole Agency for the United States.

THE

Pelouze & Audouin Condenser.

PATENT MAY 26, 1874.

With SMEDBERG'S COMBINED BYE-PASS, REVERSED FLOW, and DIFFERENTIAL GAUGE.

PATENT JULY 21, 1874.

This apparatus is based upon the recent discovery by Messrs. PELOUZE & AUDOUIN of the principle of Condensation by impact, or percussion.

All gas-makers are aware how difficult it is to separate all the Coal Tar and Water from Crude Coal Gas by mere cooling; and how frequently these liquids are swept on to the purifiers, even where scrubbers or washers of large size and considerable cost are employed.

The PELOUZE & AUDOUIN CONDENSER completely arrests these by-products, increasing the quantity of Coal Tar available for fuel or sale, reducing the tendency of the purifying material to cake on the trays, and yielding a gas-liquor of remarkable strength. Hence, all the processes of purification are facilitated, while its simultaneous arrest of heavy percentages of Naphthaline reduces the risk of stoppages to a minimum.

The subordinate patent of July 21, 1874, combines a Bypass with the Condenser; and thus saves to the purchaser the cost and slow action of three valves, together with the space occupied by these valves and the necessary connections.

The Differential Gauge is so constructed that there is no oscillation of its water-columns; while it indicates inlet pressure, outer pressure, or back-pressure, at the will of the observer.

IT IS POSITIVELY GUARANTEED THAT EVERY CONDENSER SHALL BE OF PERFECT MECHANICAL CONSTRUCTION, AND SHALL DISCHARGE ITS FUNCTIONS SATISFACTORILY.

The Condensers are now used or ordered by the following American Gas Works:

San Francisco, Cal. (3); Louisville, Ky. (2); Oakland, Cal. (1); New Orleans, La. (1); Salt Lake City, Utah (2); Philadelphia, Pa. (1); Newark, Ohio (1); Indianapolis Gas Company.

The following European Gas Works are also using the Condenser with satisfactory results:

St. Mandé; Ternes; Armint'ères; Reims; Bome; Liège; Schaffhouse; Ivry; St. Denis; Château Thierry; Douai; Florence; Berne; Loclé; Belleville; Versailles; Orléans; Courrières: Geneva; Vevey; Batavia; Frankfort-on-the-Main, and about thirty others

The Paris Gas Company, sending out a daily December maximum of about twenty-five millions cubic feet, has adopted this Condenser at each of its ten stations.

JAMES R. SMEDBERG, Consulting Engineer,
San Francisco Gas-Light Company.

HENRY CARTWRIGHT, C. E., 2107 Green Street, Philadelphia, Pa.

GAS PURIFICATION.

St. John and Cartwright's
NEW IRON COMPOSITION

Has purified, per bushel, on a single test, 10,000 feet of Westmoreland Gas. With revivification lasts indefinitely. Surpasses in POWER and ECONOMY all known materials. Saves largely in FIRST COST, SPACE, LABOR, SUPERINTENDENCE, and all current expenses. Will purify *easily* sulphurous gas, wholly *unmanageable by lime.* Takes out *all the ammonia.* Now operating in the following Gas Works: Harlem' New York (21st street); Port Morris; Hunter's Point; East New York Worcester, Lynn and Cambridge, Mass.; Lewiston, Maine; St, Albans, Vt.; Pawtucket, R. I.; Meriden, Ct., and being introduced in many other places.

Cost 70 cents per bushel. One bushel for each square foot of Purifier sufficient. Rights to use for life of Patents, for daily makes of gas in thousands; under 25,000 $200; under 50,000, $400; under 100,000, $500 $250 additional for each additional 50,000 per day.

For further information and instructions, apply to

ST. JOHN & CARTWRIGHT,
21st Street and Avenue A, New York Gas Works.

☞ Immediate arrangements are urged, as the demand for the prepared composition is increasing *so rapidly* that delays n supply may occur.

GEO. STACEY. HENRY RANSHAW WM. STACEY.

GEO. STACEY & CO.,

MANUFACTURERS OF SINGLE AND TELESCOPIC

GAS-HOLDERS,

AND ALL KINDS OF

Cast and Wrought Iron Work

Used in the Erection of Gas and Coal Oil Works.

Foundry on MILL STREET; Nos. 33, 35, 37 and 39.

Office and Wrought Iron Works on RAMSAY STREET Cincinnati, Ohio.

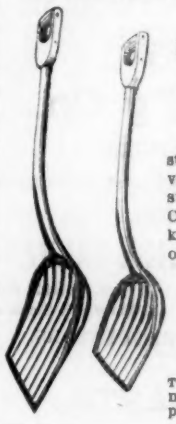
REFERENCE.

Cincinnati Gas-Light Co.	Baton Rouge, La., Gas Co.
Indianapolis Gas Co.	Saginaw, Mich., Gas Co.
Dayton, O., Gaslight Co.	Oshkosh, Wis., Gas Co.
Covington, Ky., Gas Co.	Peoria, Ill., Gas Co.
Springfield, O., Gas Co.	Quincy, Ill., Gas Co.
Terre Haute, Ind., Gas Co.	Champaign, Ills., Gas Co.
Madison, Ind., Gas Co.	Carlinville, Ill., Gas Co.
Kansas City, Mo., Gas Co.	Bowling Green, Ky., Gas Co
Topeka, Kansas, Gas Co.	Hamilton, Ohio, Gas Co.
Burlington, Iowa, Gas Co.	Vicksburg, Miss., Gas Co.
Nashville, Tenn., Gas Co.	Denver City, Cal., Gas Co.

R. T. Coverdale, Eng'r Cincinnati, and others.

REMOVAL.

BUTLER'S PATENT
Coke and Coal
SCREENING SHOVELS



MADE FROM BEST MALLEABLE IRON AND STEEL.

FURNISHED WITH LONG OR D HANDLES

Perfect in their operation, is very strong, and from their great durability vastly more economical than any substitute. Refer to all the principal gas Companies in the country, who acknowledge them as the "ne plus ultra of Coke Screening Shovels.

Orders addressed only to

HERRING & FLOYD,
Sole Agents,
740 Greenwich St., N. Y.

☞ I still retain the original SABBATON LETTERS PATENT, and have granted no rights or privileges to any other parties.

NATIONAL FOUNDRY

AND PIPE WORKS.

OFFICE AND WORKS—CARROLL, PIKE, SMALLMAN AND WILKINS STREETS,

PITTSBURGH, PA

WM. SMITH,

Manufacturer of all kinds of GAS and WATER PIPE BRANCHES, CONNECTIONS, T's, ELBOWS, and all CASTINGS USED AT GAS AND WATER WORKS,

We offer special inducements to parties wishing to purchase. My Pipe is Smooth, regular in weights, and cast vertically.

N. B.—Pipe from 3 inch and upwards, cast in 12-ft. lengths.

☞ SEND FOR CIRCULAR A PRICE LIST. ☜

PROVIDENCE
Steam & Gas Pipe Co.,

PROVIDENCE, R. I.,

BUILDERS OF

GAS WORKS

AND

GAS-HOLDERS,

RETORT HOUSE ROOFS,
PURIFIER COVERS,
COKE BARROWS,
WATER TANKS.

Particular attention given to

Enlarging and Rebuilding Gas Works.

PRINCIPAL OFFICE AND MANUFACTORY CORNER PINE AND EDDY STREETS. PROVIDENCE, R. I.

FREDERICK GRINNELL, President, J. C. HARTSHORN, Treas, F. H. MAYNARD Secretary.

CHICAGO OFFICE, 103 WASHINGTON ST., CHICAGO, ILL

FARRINGTON & BRANCH, Agents.

KIDD'S
Gas Consumers' Guide

Enables every Gas Consumer to ascertain at a glance, without any previous knowledge of the Gas Meter, the quantity and money value of the Gas consumed. Also the best method of obtaining from Gas the largest amount of its light.

It will be to the advantage of Gas Companies to supply their Consumers with one of these Guides, as a means of preventing complaints arising from their want of knowledge in regard to the registration of their meters. For sale by

A. M. CALLENDER & CO.,
42 Pine Street, New York, Room 18,

1849. HARRIS, GRIFFIN & CO., 1873.

12th and Brown Streets, Philadelphia, Penna.

and 49 DEY STREET, NEW YORK CITY.

Manufacturers of WET AND DRY GAS METERS, STATION METERS, SHOW AND TEST METERS, METER PROVERS, PRESSURE REGISTERS AND INDICATORS, BAR AND JET PHOTOMETERS, WET AND DRY CENTER VALVES, and all Apparatus pertaining to Gas Works in their line.

Patentee and Sole Manufacturer of the ORIGINAL and ONLY CORRECT GAS EXHAUST GOVERNOR.

We hereby caution all parties against making, vending, or using any GAS EXHAUST GOVERNOR that will be an encroachment of our patent.

The support and confidence of Gas Companies, so long enjoyed by us, encourage us to pursue the same undeviating course that has contributed to establish the character of our house, and with our extended experience and increased facilities, develop the latest improvement that Science can apply, in the construction of Gas Meters, etc., and thereby merit a continuance of the favors hitherto so liberally extended to us, always guaranteeing satisfaction.

ANDREW HARRIS. JOHN J. GRIFFIN.

NOW READY AND FOR SALE,

FODELL'S

System of Bookkeeping

FOR GAS COMPANIES.

Price $5, which should be sent either in Check, P. O. Order, or Registered Letter.

Blank Books, with printed headings and forms on this system, will be supplied to Gas Companies, by applying to W. P. FODELL, Philadelphia, or

A. M. CALLENDER & CO.,
Office GAS-LIGHT JOURNAL, 42 Pine St., N.Y.

McNAB & HARLIN MAN'FG CO.

MANUFACTURERS OF

BRASS COCKS

FOR STEAM, WATER AND GAS.

Plumbers Materials.

WROUGHT IRON PIPE

Gas and Steam Fitters' TOOLS.

56 JOHN STREET, N. Y.

☞ Illustrated Catalogue and Price sent on application, 378-3m

---

HERRING & FLOYD,

Oregon Iron Foundry

738, 740, 742 and 744 Greenwich St,, N. Y

MANUFACTURERS OF

ALE KINDS OF CASTINGS

AND

APPARATUS FOR GAS-WORKS.

BENCH CASTINGS
from benches of one to six Retorts each.

WASHERS: MULTITUBLAR AND AIR CONDENSERS: CONDENSERS; SCRUBBERS,

(wet and dry), and
EXHAUSTERS
for relieving Retorts from pressure.
BENDS and BRANCHES
of all sizes and description.

FLOYD'S PATENT
MALLEABLE RETORT LID.

SABBATON'S PATENT
FURNACE DOOR AND FRAME.

SELLER'S CEMENT
or stopping leaks in Retorts.

GAS GOVERNORS,

nd everything connected with well regulated Gas Works, at ow price, and in complete order.

N. B.—**STOP VALVES** from three to thirty inches—at very low prices.

SILAS C. HERRING. JAMES R. FLOYD.

GRAHAM'S

Patent Anti-Freezing LAMP POST.

THE BEST, CHEAPEST AND MOST DURABLE POST EVER OFFERED TO THE PUBLIC.

WOOSTER, OHIO
Jan. 24, 1871.

J. W. GRAHAM,

Dear Sir: Yours of the 14th inst at hand. In reply I would say that we have tested the six anti-freezing Lamp Posts purchased from you, and find them to be all as you represented. Whilst nearly a dozen of our sixty-five Posts were frozen down last month and first of this not one of yours was affected by the heavy frost. What can you sell them at?

Yours truly,
LUCAS FLATTERY
Sec'y Wooster Gas-Light Co.

Address the Patentee,
J. W. GRAHAM,
289-9t Chillicothe, Ohio.

LUDLOW Valve Manf'g Co.,

OFFICE AND WORKS

938 to 954 River Street and 67 to 83 Vail Ave

TROY, NEW YORK.

BRASS AND IRON SLIDE VALVES.

(Double and Single Gate ¾ inch to 36 inch—outside and inside screws, Indicator etc.) for Gas, Water and Steam—

HYDRAULIC MAIN DIP REGULATORS.

ALSO

FIRE HYDRANTS.

REFERENCES FURNISHED.

SEND FOR CIRCULARS.

JOHN P. KENNEDY,

SUCCESSOR TO

Hoy, Kennedy & Co.,

GAS ENGINEER AND CONTRACTOR

For the Erection, Alteration and Extension of Gas Works.

PLANS, SPECIFICATIONS AND ESTIMATES.

Office 98 Liberty Street. P. O. Box 2,348

AGENT FOR THE

ATLANTIC DOCK

Iron & Machine Works,

FERRIS, WOLCOTT AND DYKEMAN STREETS,

South Brooklyn.

MANUFACTURERS of every kind of Gas Machinery, Retorts Bench Castings, Wrought Iron Work, Multitubular and Air Condensers, Washers, Scrubbers, Purifiers, Exhausters with every equipment complete for large or small Works, Gasholders, Telescopic or Single; Iron Roof Frames with Cornice Gutters, covered with Corrugated Iron or Slate; Iron Doors and Iron Pivot Blind Windows; Coke Barrows, Fire Tools, Retort Lids, Cotter Bars and Screws, Stop Valves, Tar Valves for Regulating Dip in Hydraulic Mains, Pressure Governors for Street Mains, and Compensators for Exhausters that are unrivalled for unvarying accuracy Steam Engines, Boilers, Etc., Etc.

Post Office Box 2,348. Office 98 Liberty st

SCHOOL OF MINES,

COLUMBIA COLLEGE,

EAST 49th STREET, NEW YORK.

FACULTY:

F. A. P. BARNARD, S.T.D., LL.D., President.
T. EGLESTON, Jr., E.M., Mineralogy and Metallurgy.
FRANCIS L. VINTON, E.M., Mining Engineer.
C. F. CHANDLER, Ph. D., Analytical and Applied Chemistry.
JOHN TORREY, M.D., LL.D., Botany.
CHARLES A. JOY, Ph.D., General Chemistry.
WILLIAM G. PECK, LL.D., Mechanics.
JOHN H. VAN AMRINGE, A.M., Mathematics.
OGDEN N. ROOD, A.M., Physics.
JOHN S. NEWBERRY, M.D., Geology and Palæontology.

The plan of this School embraces a three years' course for the degree of Engineer of Mines, or Bachelor of Philosophy.

For admission, candidates for a degree must pass an examination in arithmetic, algebra, geometry and plain trigonometry. Persons not candidates for degrees are admitted without examination, and may pursue any or all of the subjects taught. For further nformation and for catalogue, apply to

DR. C F. CHANDLER,
252-1y Dean of Faculty.

Prof. Henry Wurtz,

Chemist and Geologist.

Offers his professional services, in the field and the laboratory, in the investigation, by the most recent and advanced scientific methods, of all questions of Water supply of towns dwellings, factories, steam-boilers, etc. Chemical Analyses of River; Lake, Spring and Well-Waters, made by the most improved methods.

Prof. W. makes a specialty of GAS CHEMISTRY, and the Analysis of Gas, Gas and other Coals, and Potable Waters. Has special laboratories and unequalled facilities for these purposes. Formerly Chemical Examiner in the U S. Patent Office, and peculiarly competent.

SAMUEL DOWN, President. THOMAS J. EARLE, Secretary. T. C. HOPPER, General Superintendent.

AMERICAN METER COMPANY,

MANUFACTURERS OF

Wet and Dry Gas Meters (with Slide or Rotary Valves), Station Meters, Dry Centre Valves, Pressure Registers, Pressure and Vacuum Registers, Meter Provers, King's Pressure and Vacuum Gauges, Exhauster Governors, Experimental Meters, Watchman Clocks, Etc., Etc.

☞ Sole Agents for W. Sugg's **PHOTOMETRICAL** and **ANALYTICAL GAS APPARATUS.**

A full assortment of the above kept at the Manufactories and Agencies, where orders may be addressed,

Agencies.

37 Water Street, Cincinnati.
20 South Canal Street, Chicago.
511 Olivo Street, St. Louis.

American Meter Company,

512 West Twenty-second Street, New York.
Arch and Twenty-second Street, Philadelphia.
548 Washington Street, Boston.

HARRIS & BROTHER,

ESTABLISHED 1848.

PRACTICAL GAS METER MANUFACTURERS,

Continue as heretofore at the OLD ESTABLISHMENT, Nos. 1115 and 1117 Cherry Street, Philadelphia, Pa.,

To manufacture Wet and Dry Gas Meters, Station Meters, Experimental Meters, Meter Provers, Centre Seals, Governors, Pressure Registers, Indicators, Photometers, and all kinds of Gas Apparatus; Also furnish all other Articles appertaining to the use of Gas Works.

From our long Practical Experience of the Business (covering a period of 20 years) and from our personal supervision of all Work, we can guarantee all orders to be executed promptly, and in every respect satisfactorily.

J. Wesley Harris, Washington Harris, William Helme.

WILLIAM W. GOODWIN & CO.

No. 1012, 1014 and 1016 Filbert Street,

Philadelphia, Penn'a.

MANUFACTURERS OF

Dry and Wet GAS METERS, Station Meters (Square, Cylindrical or in Staves), Glazed Meters, King's and Sugg's Experimental Meters, Lamp Post Meters, Etc., Etc., Meter Provers (sizes 2, 5 and 10 feet), Pressure Guages of all kinds, Pressure Registers, Pressure and Vacuum Registers, Pressure Indicators (sizes 4 inch, 6 inch and 9 inch), King's Pressure and Vacuum Gauges, Dry and Wet Centre Seals, Dry and Wet Governors, Exhauster Governors, Photometers of all descriptions. Letheby's Sulphur and Ammonia Test Apparatus complete—also Testing and Chemical Apparatus of all kinds, and of the most perfect description, for all purposes relating to Gas.

Goodwin's Improved Lowe's Jet Photometer.

W. W. Goodwin is the author of the History and Principles involved in the use of Lowe's Jet Photometer. Also Patentee and we are the SOLE MANUFACTURERS of the ORIGINAL and ONLY DIAL whereby the CANDLE POWER and PRESSURE can be instantly read, and all others are infringements.

Special attention to repairs of Meters, and all apparatus connected with the business.

All work guaranteed first class in every particular, and orders filled promptly.

WILLIAM WALLACE GOODWIN. [335 1y] HOWARD KIRK, Special Partner.

$30 per Dozen.

DEAN'S

NEW PATENT (1873)

Screening Scoop SHOVEL

FOR COKE, COAL, ASHES, AND OTHER SUBSTANCES.

The frames are 12 by 18 inches, with seven bars, and are made of the best malleable Iron. They can be wired between bars by an arrangement of holes a quarter of an inch apart, by an ordinary person, to screen any size substance desired. They are warranted to be the most durable and practical Screening Shovel made, or money refunded.

Reference—All New York Gas Companies and Hotels.

Price, $30 per Dozen.

Sample sent gratis to any Company, if desired.

☞ Smaller sizes on hand. Please address orders to A. SEE & SON,
N. Y. Shovel Works, No. 1358 B'way, N. Y

MURRAY & BAKER,

Practical Builders,

And Contractors for the Erection of Gas Works,

MANUFACTURERS OF ALL THE LATEST AND MOST IMPROVED APPARATUS AND TOOLS FOR THE MANUFACTURE & DISTRIBUTION OF COAL GAS.

☞ WORKS AT THE RAILWAY DEPOTS,

FORT WAYNE, INDIANA.

We manufacture Bench Castings, Washers, "The Immersed Multitubular," and Atmospheric Condensers, Wet and Dry-Lime Purifiers, Dry Center Seals, Telescopic and Single Gas Holders, Wrought Iron Trussed Roof for Iron or Slate; Wood and Iron Trays for Purifiers, Coke and Coal Carts, Wrought Iron Screening Shovels and Castings, and Wrought Work of every description for Gas-Works.

As Mr. Murray is a Practical Draughtsman, we will furnish plans and specifications to parties or associations, or will wait personally upon parties contemplating the construction of new works, or the alteration or extension of old ones

The most satisfactory references can be given, if required of the experience and commercial fairness which characterizes our dealings.

We would respectfully invite Western men to call and see our patterns and works here. MURRAY & BAKER,
Fort Wayne, Indiana.

B. S. BENSON.

MANUFACTURER OF

Cast Iron Pipes and Fittings,

AND

Gas and Water Mains.

All sizes from 3 to 30 inch cast vertically in 12½ feet lengths

Office & Factory 52 East Monument St.,

BALTIMORE, MD.

C. CEFRORER,

Manufacturer of

GAS BURNERS,

GAS HEATING AND COOKING APPARATUS

FITTERS' PROVING APPARATUS, ETC.,

No. 248 North Eighth Street, Philadelphia.

THOMAS T. TASKER Jr. STEPHEN P. M. TASKER.

MORRIS, TASKER & CO.,

PASCAL IRON WORKS, PHILADELPHIA.

TASKER IRON WORKS, NEWCASTLE, DEL.

Office, Fifth and Tasker Streets, Philadelphia.

Office and Warehouse, 15 Gold Street, New York.

Office and Warehouse 36 Oliver Street, Boston, Mass.

Established 1821.

FOR GAS WORKS MACHINERY, ADDRESS OFFICE FIFTH AND TASKER STREETS, PHILADELPHIA.

Manufacturers and Builders of Gas Works, &c., of all Descriptions, of the Most Approved Plans.

WROUGHT IRON ROOF FRAMES.—For Slate, or Corrugated Iron Coverings, with Cast Iron Cornice Gutter. Iron Doors and Frames, Wrought Iron Pivot Blinds, Windows and all kinds of Castings and Smith Work for Buildings.

BENCH CASTINGS.—Retorts, and all Castings and Wrought Iron Work required for Setting them on the Latest Plan. Tar Gates, Wrought Iron Stand Pipes, Retort Lids, Cotter Bars, Coal and Coke Wagons, and Stokers' Tools.

EXHAUSTERS.—Exhausters and Compensators, By-Passes to pass from 4,000 to 150,000 Cubic feet of Gas per hour, with Engines, Governors, Pressure and Vacuum Guages.

SCRUBBERS.—Single or Multitubular Scrubbers, with Self-Acting Pumps for Ammonia Water.

WASHERS.—Cataract and Single and Multitubular Spray Washers.

CONDENSERS.—Single and Multitubular Air and Water Condensers.

PURIFIERS.—For Purifying from 1,000 to 2,000,000 cubic feet capacity daily, with either wet or dry Lime, or Oxide of Iron, and with either Ash Rivetted or Wrought or Cast Iron Lime Sieves.

CARRIAGES.—Movable Lifting Carriages for Purifiers, arranged either for Floor or Overhead use.

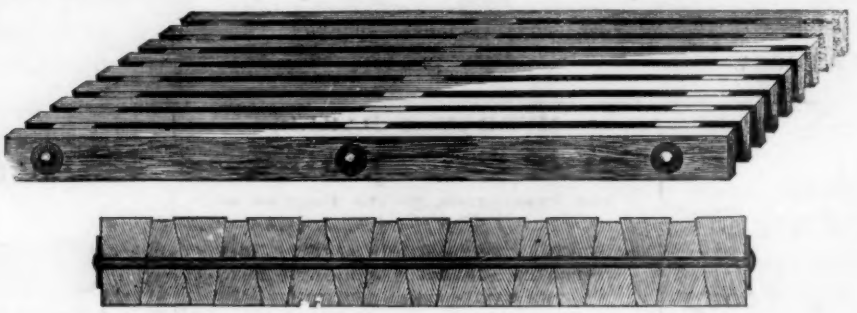
METERS.—Square and Round Meters of any capacity.

GAS HOLDERS.—Single Lift and Telescopic Gasholders, with Cast or Wrought Iron Suspension Frames.

GAS GOVERNORS.—Station Governors, with Regulating and Indicating Columns for Inlet and Outlet Pipes, also Dry Governors with Flexible Diaphragms for Underground Pipes.

STOP VALVES.—Double Faced Stop Valves for Gas or Water, from three inches to forty-eight inches diameter. These Valves are proved on both sides, with a heavy Water Pressure, Flange and Bell Pipes, Fittings and Drips of all descriptions. Steam Boilers and Hot Water Apparatus for Heating Building, and Gas Holder Tanks. Lamp Posts and Lanterns.

P. Munzinger's Patent Ash Lime Trays.



In use at the following Gas-Light Companies:

Pittsburg Gas Company, Pa.
Peoples Gas Company, Baltimore.
Lowell Gas-Light Company, Mass.
Lynn Gas-Light Company, Mass.
Albany Gas-Light Company, N. Y.
Schenectady Gas Light Company, N. Y.
Utica Gas-Light Company, N. Y.
Jersey City Gas Company, N. J.
St. Paul Gas-Light Company, Minn.
Cumberland Gas-Light Company, Md.
Hartford City Gas-Light Company, Conn.
Richmond Gas Company, Va.
McKeesport Gas Company, Pa.
Middletown Gas Company, Pa.
East Newark Gas-Light Company, N. J.
Binghampton Gas Company, N. J.
Zanesville Gas Company, Ohio.

New Orleans Gas Company, La.
Salem Gas-Light Company, Mass.
New Britain Gas-Light Company, Conn.
Rahway Gas-Light Company, N. J.
Trenton Gas-Light Company, N. J.
Elmira Gas Company, New York.
Erie Gas Company, Pa.
Columbus Gas-Light Company, Ohio,
Westchester Gas-Light Company, N. Y.
Santa Cruz Gas Company, Cal.
Lawrence Gas-Light Company, Kansas.
Salem Gas Company, N. J.
Indiana Gas-Light Company, Pa.
Peoria Gas Company, Ill.
Montclair Gas Company, N. J.
Williamsport Gas Company, Pa.
Wooster Gas Light Company, Ohio.

Augusta Gas-Light Company, Ga.
Huntsville Gas Company, Ga.
Chattanooga Gas Company Tenn.
Murfreesboro Gas Company, Tenn.
Hagerstown Gas-Light Company, Md.
Hanover Gas Company, Pa.
Easton Gas Company, Pa.
Uniontown Gas-Light Company, Pa.
Coatesville Gas-Light Company, Pa.
Houston, Gas Company, Texas.
Wilkesbarre Gas Company, La.
Middletown Gas Company, New York.
Washington Gas-Light Company, Pa.
Princeton Gas-Light Company, N. J.
Newark Gas Company, Ohio.
Pontiac Gas-Light Company, Mich.
And numerous other Companies.